



Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A3 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of October 1, 2000 to and Including December 31, 2000, Task 31

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Preface

This 12-part report documents the data obtained from various sensor measurements taken aboard the Russian Express-A2 and Express-A3 spacecraft in Geosynchronous Earth Orbit (GEO). These GEO communications satellites, which were designed and built by NPO Prikladnoy Mekhaniki (NPO PM) of Zheleznogorsk, Russia, utilize Hall thruster propulsion systems for north-south and east-west station-keeping and as of June 2002, were still operating at 80° E. and 11° W., respectively. Express-A2 was launched on March 12, 2000, while Express-A3 was launched on June 24, 2000. The diagnostic equipment from which these data were taken includes electric field strength sensors, ion current and energy sensors, and pressure sensors. The diagnostics and the Hall thruster propulsion systems are described in detail along with lists of tabular data from those diagnostics and propulsion system and other satellite systems.

Space Power, Inc., now part of Pratt & Whitney's Chemical Systems Division, under contract NAS3-99151 to the NASA Glenn Research Center, obtained these data over several periods from March 12, 2000, through September 30, 2001. Each of the 12 individual reports describe, in detail, the propulsion systems as well as the diagnostic sensors utilized.

Finally, parts 11 and 12 include the requirements to which NPO PM prepared and delivered these data.

Filename	Title
CR-2003-212005-PART1.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A2 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of March 12, 2000 to and Including June 15, 2000, Task 29
CR-2003-212005-PART2.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire TM-Data for Type B Sensors for "Express-A" Number 2 Satellite for the Period of March 12, 2000 to and Including June 15, 2000, Task 25
CR-2003-212005-PART3.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A3 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of June 24, 2000 to and Including September 30, 2000, Task 30
CR-2003-212005-PART4.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire TM-Data for Type A and Type B Sensors for "Express-A" Number 3 Satellite for the Period of June 24, 2000 to and Including September 30, 2000, Task 27A

Filename	Title
CR-2003-212005-PART5.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A3 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of October 1, 2000 to and Including December 31, 2000, Task 31
CR-2003-212005-PART6.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire TM-Data for Type A and Type B Sensors for "Express-A" Number 3 Satellite for the Period of October 1, 2000 to and Including December 31, 2000, Task 27B
CR-2003-212005-PART7.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A3 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of January 1, 2001 to and Including March 31, 2001, Task 32
CR-2003-212005-PART8.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire TM-Data for Type A and Type B Sensors for "Express-A" Number 3 Satellite for the Period of January 1, 2001 to and Including March 31, 2001, Task 27C
CR-2003-212005-PART9.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire Express-A3 SPT-100 Based Propulsion Subsystem and Other Subsystem Flight Operation TM-Data for the Period of July 1, 2001 to and Including September 30, 2001, Task 33
CR-2003-212005-PART10.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Acquire TM-Data for Type A and Type B Sensors for "Express-A" Number 3 Satellite for the Period of July 1, 2001 to and Including September 30, 2001, Task 27D
CR-2003-212005-PART11.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Express/T-160E Project Express A2 and A3 Data Agreement Document
CR-2003-212005-PART12.pdf	Hall Effect Thruster Interactions Data From the Russian Express-A2 and Express-A3 Satellites Express/T-160E Project Express A2 and A3 Sensors Operations Procedures Document

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS	vi
INTRODUCTION.....	1
1. ORBIT CONTROL PROPULSION.....	2
1.1. SPT-100 THRUSTERS FUNCTIONING DATA	2
1.2. START-UP AND OPERATION OF THRUSTERS FOR PERFORMING STATION KEEPING OPERATIONS.....	5
1.2.1. Lists of Firing Commands.....	6
1.2.2. Telemetry Data Tables	7
1.3. THRUST BASED ON RANGING RESULTS DURING EAST-WEST AND NORTH-SOUTH MANEUVERS.....	8
1.4. COMMENTS ON SPT OPERATION	8
2. EXPRESS-A #3 ON-BOARD SUBSYSTEMS	9
2.1. POWER SUPPLY SUBSYSTEM	9
2.1.1. Temperatures of SA Panels	9
2.1.2. Parameters for SA Panels	10
2.2. ATTITUDE DETERMINATION AND CONTROL SUBSYSTEM.....	11
2.2.1. Disturbing Torques when operating the SPT-100 Thrusters during the station keeping operations (Firings #1.1 to #1.6 and #1.9).....	11
2.2.2. Disturbing Torques when operating the SPT-100 thrusters during the orbit eccentricity control operations (Firings #1.7 and #1.8).....	11
2.2.3. Attitude Control Propulsion Subsystem.....	12
2.3. Thermal Control Subsystem	13
2.4. ON-BOARD NAVIGATION SUBSYSTEM.....	14
2.5. COMMUNICATIONS MODULE.....	14
ANNEX 1.TELEMETRY DATA TABLE WHEN OPERATING THE T4C1 THRUSTER ON 06/10/00	15
ANNEX 2.TELEMETRY DATA TABLE WHEN OPERATING THE T4C1 THRUSTER ON 27/10/00	20
ANNEX 3.TELEMETRY DATA TABLE WHEN OPERATING THE RT4C1 THRUSTER ON 31/10/00	25
ANNEX 4.TELEMETRY DATA TABLE WHEN OPERATING THE T4C1 THRUSTER ON 15/11/00	30
ANNEX 5.TELEMETRY DATA TABLE WHEN OPERATING THE T4C1 THRUSTER ON 25/11/00	36
ANNEX 6.TELEMETRY DATA TABLE WHEN OPERATING THE RT4C1 THRUSTER ON 29/11/00	41
ANNEX 7.TELEMETRY DATA TABLE WHEN OPERATING THE RT1C1 THRUSTER ON 04/12/00	48
ANNEX 8.TELEMETRY DATA TABLE WHEN OPERATING THE RT2C1 THRUSTER ON 05/12/00	53
ANNEX 9.TELEMETRY DATA TABLE WHEN OPERATING THE RT4C1 THRUSTER ON 21/12/00	59

Abbreviations and Acronyms

A	.....Amps
DK	.....Pressure of Xenon Feed Unit output
DKR1	.....Pressure of primary Xenon Feed Branch
DKR2	.....Pressure of redundant Xenon Feed Branch
DVK	.....Pressure of Xenon Feed Unit input
EV	.....Electrical valve
EWSK	.....East-West Station Keeping
Hn	.....Heater number "n"
HETS	.....Hall Effect Thruster System
I	.....Current
NSSK	.....North-South Station Keeping
PPU	.....Power Processing Unit
PRD	.....Pressure regulation device
PS	.....Propulsion System
PV	.....Pyrotechnic Valve
RT	.....Redundant Thruster
RV	.....Reducing Valve
SA	.....Solar Array
SAn	.....Solar Array Panel number "n"
SPT-100	.....Stationary Plasma Thruster with 100 mm
T	.....Thruster
T18R	.....Temperature 1 of the Cylindrical Radiator
T19R	.....Temperature 2 of the Cylindrical Radiator
T1PK	.....Temperature of Xenon Feed Unit
T1SA	.....Temperature of Solar Array Panel number 1
T28K	.....Temperature of the Pressurized Container Surface
T2SA	.....Temperature of Solar Array Panel number 2
TBHKn	.....Temperature of Xenon Storage Unit number "n"
TBKn	.....Temperature of Thruster number "n"
TUn	.....Thruster Unit number "n"
V	.....Voltage, Volts
Vn	.....Valve number "n"
XFU	.....Xenon Feed Unit
XSUn	.....Xenon Storage Unit number "n"

Introduction

The Express-A #3 Spacecraft has been entered into geostationary orbit on June 24, 2000. The spacecraft's electric jet propulsion based on the SPT-100 stationary plasma thrusters is used to provide both the longitude and inclination orbit control.

This Report is issued in accordance with the requirements of the Task #31 under the Contract #97-1088-02 and prepared in compliance with agreed upon contents of the sections of the "EXPRESS/T160E Project Express A2 and A3 Data Agreement Document dated on October 29, 2000" document.

This Document includes the flight operational data for the SPT-100 Propulsion at level of the Express-A #3 Spacecraft for a period of October 01 to December 31, 2000.

In this Document all the being measured parameters and their changes are referenced to Moscow Standard Time.

1. Orbit Control Propulsion

1.1. SPT-100 Thrusters Functioning Data

For a period of October 01 through December 31, 2000, the SPT-100 Thrusters firings were conducted to perform the following tasks:

- From 02/10/00 to 31/12/00: performing the longitude/inclination station keeping operations for the Express-A #3 Spacecraft,
- On 04/12/00 and 05/12/00: performing the operations to control an orbit eccentricity.

Total operating time and number of firings for each thruster on each cathode for the period of October 01 to December 31, 2000 are provided in Table 1.

Table 1

Thruster No	Cathode No	Firing duration, hh:mm:ss	Firing number
T1	C1	00:00:00	0
T1	C2	00:00:00	0
RT1	C1	01:25:00	1
RT1	C2	00:00:00	0
T2	C1	00:00:00	0
T2	C2	00:00:00	0
RT2	C1	01:30:00	1
RT2	C2	00:00:00	0
T3	C1	00:00:00	0
T3	C2	00:00:00	0
RT3	C1	00:00:00	0
RT3	C2	00:00:00	0
T4	C1	50:22:49	35
T4	C2	00:00:00	0
RT4	C1	58:59:58	43
RT4	C2	00:00:00	0

Data for each SPT-100 firing and its duration for the reported period are provided in Table 2.

Table 2

Date (dd/mm/yy)	Thruster No	Cathode No	Operating Time (hh:mm:ss)
02/10/00	T4	C1	01:10:57
03/10/00	T4	C1	01:10:57
04/10/00	RT4	C1	01:10:58
05/10/00	RT4	C1	01:10:58
06/10/00	T4	C1	01:10:58
07/10/00	RT4	C1	01:10:59
08/10/00	T4	C1	01:11:00
09/10/00	RT4	C1	01:11:00
10/10/00	T4	C1	01:11:00
11/10/00	RT4	C1	01:11:01
12/10/00	T4	C1	01:11:01
13/10/00	RT4	C1	01:11:01
16/10/00	T4	C1	01:11:04
17/10/00	RT4	C1	01:11:04
18/10/00	RT4	C1	01:11:05
19/10/00	T4	C1	01:11:04

Date (dd/mm/yy)	Thruster No	Cathode No	Operating Time (hh:mm:ss)
20/10/00	T4	C1	01:11:05
21/10/00	RT4	C1	01:11:06
22/10/00	T4	C1	01:11:06
23/10/00	RT4	C1	01:11:07
24/10/00	T4	C1	01:11:07
25/10/00	RT4	C1	01:11:08
26/10/00	RT4	C1	01:11:08
27/10/00	T4	C1	01:11:09
30/10/00	RT4	C1	01:11:10
31/10/00	RT4	C1	01:11:11
01/11/00	RT4	C1	01:11:11
02/11/00	T4	C1	01:11:11
03/11/00	RT4	C1	01:11:12
04/11/00	RT4	C1	01:11:12
05/11/00	RT4	C1	01:11:13
06/11/00	T4	C1	01:11:14
07/11/00	RT4	C1	01:11:14
08/11/00	T4	C1	01:11:14
09/11/00	RT4	C1	01:11:14
10/11/00	T4	C1	01:11:15
13/11/00	T4	C1	01:09:49
14/11/00	RT4	C1	01:09:50
15/11/00	T4	C1	02:00:00
16/11/00	RT4	C1	02:00:00
17/11/00	RT4	C1	01:09:51
18/11/00	T4	C1	02:00:00
19/11/00	RT4	C1	01:09:52
20/11/00	T4	C1	01:09:53
21/11/00	RT4	C1	01:09:53
22/11/00	RT4	C1	01:09:54
23/11/00	T4	C1	01:09:54
24/11/00	RT4	C1	01:09:55
25/11/00	T4	C1	01:09:55
26/11/00	RT4	C1	01:09:55
29/11/00	RT4	C1	02:00:00
30/11/00	RT4	C1	01:11:24
01/12/00	RT4	C1	01:11:25
02/12/00	RT4	C1	01:11:26
03/12/00	RT4	C1	01:11:26
04/12/00	RT1	C1	01:25:00
05/12/00	RT2	C1	01:30:00
05/12/00	RT4	C1	01:11:27
06/12/00	RT4	C1	01:11:28
07/12/00	T4	C1	01:11:28
08/12/00	T4	C1	01:11:29
09/12/00	T4	C1	01:11:29
10/12/00	T4	C1	01:11:30
13/12/00	T4	C1	02:00:00
14/12/00	RT4	C1	02:00:00
15/12/00	T4	C1	02:00:00
16/12/00	RT4	C1	02:00:00
17/12/00	T4	C1	02:00:00
18/12/00	RT4	C1	02:00:00

Date (dd/mm/yy)	Thruster No	Cathode No	Operating Time (hh:mm:ss)
19/12/00	T4	C1	02:00:00
20/12/00	RT4	C1	02:00:00
21/12/00	RT4	C1	02:00:00
22/12/00	T4	C1	02:00:00
23/12/00	RT4	C1	02:00:00
24/12/00	RT4	C1	02:00:00
27/12/00	T4	C1	02:00:00
28/12/00	T4	C1	02:00:00
29/12/00	T4	C1	02:00:00
30/12/00	T4	C1	02:00:00
31/12/00	RT4	C1	02:00:00

1.2. Start-up and operation of thrusters for performing station keeping operations

SPT-100 Thruster Flight Operation Data when performing the station keeping operations is provided for the following firings:

# 1.1)	Thruster:	T4C1
	Date and Time of switching on:	06/10/00 at 20:45:24;
	Date and Time of switching off:	06/10/00 at 21:56:22.
	Operating Time:	01:10:58.
# 1.2)	Thruster:	T4C1
	Date and Time of switching on:	27/10/00 at 19:22:56;
	Date and Time of switching off:	27/10/00 at 20:34:05.
	Operating Time:	01:11:09.
# 1.3)	Thruster:	RT4C1
	Date and Time of switching on:	31/10/00 at 19:06:56;
	Date and Time of switching off:	31/10/00 at 20:18:07.
	Operating Time:	01:11:11.
# 1.4)	Thruster:	T4C1
	Date and Time of switching on:	15/11/00 at 16:57:05;
	Date and Time of switching off:	15/11/00 at 18:57:05.
	Operating Time:	02:00:00.
# 1.5)	Thruster:	T4C1
	Date and Time of switching on:	25/11/00 at 17:29:48;
	Date and Time of switching off:	25/11/00 at 18:39:43.
	Operating Time:	01:09:55.
# 1.6)	Thruster:	RT4C1
	Date and Time of switching on:	29/11/00 at 16:49:44;
	Date and Time of switching off:	29/11/00 at 18:49:44.
	Operating Time:	02:00:00.
# 1.7)	Thruster:	RT1C1
	Date and Time of switching on:	04/12/00 at 18:49:44;
	Date and Time of switching off:	04/12/00 at 20:14:44.
	Operating Time:	01:25:00.
# 1.8)	Thruster:	RT2C1
	Date and Time of switching on:	05/12/00 at 05:59:44;
	Date and Time of switching off:	05/12/00 at 07:29:44.
	Operating Time:	01:30:00.
# 1.9)	Thruster:	RT4C1
	Date and Time of switching on:	21/12/00 at 15:22:04;
	Date and Time of switching off:	21/12/00 at 17:22:04.
	Operating Time:	02:00:00.

1.2.1. Lists of Firing Commands

Sequence of commands for firing the thrusters #1.1 to #1.6 and date and time of their execution are provided in Table 3. Sequence of commands for firing the thrusters #1.7 to #1.9 and date and time of their execution are provided in Table 4.

Table 3

Command	Date and Time of Execution					
	# 1.1 06/10/00	# 1.2 27/10/00	# 1.3 31/10/00	# 1.4 15/11/00	# 1.5 25/11/00	# 1.6 29/11/00
Channel “minus Z”	20:40:44	19:18:16	19:02:16	16:52:24	17:25:08	16:45:04
RV1 Opening	20:40:44	19:18:16	19:02:16	16:52:24	17:25:08	16:45:04
T (RT) Preparation	20:42:44	19:20:16	19:04:16	16:54:24	17:27:09	16:47:04
C Preparation	20:42:46	19:20:19	19:04:18	16:54:26	17:27:10	16:47:06
T Valves Opening	20:45:16	19:21:48	19:06:48	16:56:56	17:29:40	16:49:36
Ignition	20:45:24	19:22:56	19:06:56	16:57:04	17:29:48	16:49:44
C Switching Off	20:45:24	19:22:56	19:06:56	16:57:05	17:29:48	16:49:44
RV Closing	21:46:22	20:24:05	20:08:07	18:47:05	18:29:43	18:39:44
T Switching Off	21:56:22	20:34:05	20:18:07	18:57:05	18:39:43	18:49:44

Table 4

Command	Date and Time of Execution			Comments
	# 1.7 04/12/00	# 1.8 05/12/00	# 1.9 21/12/00	
Channel “i”	18:45:04	05:55:04	15:17:24	When Firing 1.7 i = minus Y; When Firing 1.8 i = minus Y; When Firing 1.9 i = minus Z.
RV1 Opening	18:45:04	05:55:04	15:17:24	
T (RT) Preparation	18:47:04	05:57:04	15:19:24	
C Preparation	18:47:06	05:57:06	15:19:26	
T Valves Opening	18:49:36	05:59:36	15:21:56	
Ignition	18:49:44	05:59:44	15:22:04	
C Switching Off	18:49:44	05:59:44	15:22:04	
RV Closing	20:04:44	07:19:44	17:12:04	
T Switching Off	20:14:44	07:29:44	17:22:04	

1.2.2.Telemetry Data Tables

- #1.1) Telemetry data table when operating the T4C1 Thruster on 06/10/00 is given in Annex 1.
- #1.2) Telemetry data table when operating the T4C1 Thruster on 27/10/00 is given in Annex 2.
- #1.3) Telemetry data table when operating the RT4C1 Thruster on 31/10/00 is given in Annex 3.
- #1.4) Telemetry data table when operating the T4C1 Thruster on 15/11/00 is given in Annex 4.
- #1.5) Telemetry data table when operating the T4C1 Thruster on 25/11/00 is given in Annex 5.
- #1.6) Telemetry data table when operating the RT4C1 Thruster on 29/11/00 is given in Annex 6.
- #1.7) Telemetry data table when operating the RT1C1 Thruster on 04/12/00 is given in Annex 7.
- #1.8) Telemetry data table when operating the RT2C1 Thruster on 05/12/00 is given in Annex 8.
- #1.9) Telemetry data table when operating the RT4C1 Thruster on 21/12/00 is given in Annex 9.

1.3. Thrust based on ranging results during East-West and North-South maneuvers

Effective thrust determination results for Express-A #3 Orbit Control Propulsion Subsystem are given in Table 5.

Table 5

Ascertain Thruster Operating Period	Ascertain Thruster No	Effective Thrust, mN
19.09 - 27.10.2000	T4, RT4	80,5
30.10 - 10.11.2000	T4, RT4	71,3
13 - 26.11.2000	T4, RT4	65,5
29.11 - 10.12.2000	T4, RT4	78,8
13 - 24.12.2000	T4, RT4	78,5

For the North-South orbit control thrusters T4 and RT4 when determining a mean-integral value of effective thrust it was assumed that thrust values of all thrusters at all firings to be fell in a measurement interval are equal. In this case the measurement interval is a time period between two ranging cycles, of which there are performed SPT-100 thruster firings.

The longer the measurement interval, the higher an accuracy of mean-integral thrust value calculation. This is clarified as follows: the longer the measurement interval, the greater the change of orbit parameters due to the SPT-100 thruster firings, and accordingly, the lesser an influence of possible uncertainties when determining the orbit parameters based on the ranging data.

1.4. Comments on SPT Operation

No any comments on SPT-100 operation within the period of 01/10/00 to 31/12/00 are recorded. All the operations on the Express-A #3 Orbit Control Propulsion Subsystem were performed in accordance with the specified logic and no any additional measures were taken.

2. Express-A #3 On-Board Subsystems

2.1. Power Supply Subsystem

2.1.1. Temperatures of SA Panels

Table 6 provides the SA temperature variations for a day of 21/12/00.

Table 6

Time	SA Panel 1 Temperature (°C)	SA Panel 2 Temperature (°C)
00:00:00	38,3	37,2
01:00:00	37,2	36,0
02:00:00	37,2	36,0
03:00:00	38,3	36,0
04:00:00	38,3	36,0
05:00:00	38,3	37,2
06:00:00	39,4	37,2
07:00:00	33,8	37,2
08:00:00	39,4	37,2
09:00:00	38,3	37,2
10:00:00	40,1	34,9
11:00:00	39,4	37,2
12:00:00	39,4	37,2
13:00:00	41,7	37,2
14:00:00	41,7	38,3
15:00:00	40,6	38,3
16:00:00	36,0	37,2
17:00:00	36,0	37,2
18:00:00	37,2	37,2
19:00:00	38,3	37,2
20:00:00	38,3	38,3
21:00:00	38,3	39,4
22:00:00	37,2	36,0
23:00:00	38,3	38,3
23:59:59	39,4	37,2

2.1.2.Parameters for SA Panels

Table 7 provides information on parameters for the SA panels. They were measured once per month during a flight operation of the Express-A #3 satellite.

Table 7

Date & Time of Measurement	Panels SA1 & SA2		Panel SA3		Panel SA4	
	I _{CC} (A)	U _{OC} (V)	I _{CC} (A)	U _{OC} (V)	I _{CC} (A)	U _{OC} (V)
25/10/00 10:50	105,3	47,2	17,9	46,6	17,9	46,6
27/11/00 11:40	100,3	46,4	17,0	45,8	17,2	45,8
21/12/00 15:15	99,1	46,3	16,8	45,8	17,0	45,8

Notes:

1. I_{CC} is SA output current.
2. U_{OC} is open-circuit voltage.
3. Output currents for the SA1 and SA2 sections are measured at voltage of 30,3 V; for the SA3 and SA4 sections - at 27,8 V.
4. Steps of measurement are:
 - Current of SA1 and SA2 Sections are: 0,7 A,
 - Current of SA3 and SA4 Sections are: 0,2 A,
 - Voltage: 0,3 V.

2.2. Attitude Determination and Control Subsystem

2.2.1. Disturbing Torques when operating the SPT-100 Thrusters during the station keeping operations (Firings #1.1 to #1.6 and #1.9)

Values of the disturbing torques (M_x , M_y , M_z) observable when operating the SPT-100 thrusters are provided in Table 8.

Table 8

Thruster #	Cathode #	SA Angle (degrees)	Data (dd/mm/yy)	Disturbing Torque X (N·m)	Disturbing Torque Y (N·m)	Disturbing Torque Z (N·m)
T4	C1	180	06.10.2000	-1.29E-03	2.77E-03	2.61E-04
T4	C1	150	27.10.2000	-3.63E-03	-1.12E-04	-1.21E-04
		165	27.10.2000	-2.88E-03	1.20E-03	-2.52E-05
RT4	C1	150	31.10.2000	-2.56E-03	-1.44E-03	-3.05E-04
T4	C1	120	15.11.2000	-3.21E-03	-2.61E-03	-3.18E-04
		135	15.11.2000	-3.62E-03	-1.56E-03	-2.62E-04
T4	C1	120	25.11.2000	-3.18E-03	-2.80E-03	-3.25E-04
		135	25.11.2000	-3.60E-03	-1.59E-03	-2.81E-04
RT4	C1	105	29.11.2000	-6.99E-04	-4.54E-03	2.07E-04
		120	29.11.2000	-2.07E-03	-4.14E-03	-5.69E-05
		135	29.11.2000	-2.60E-03	-3.26E-03	-1.81E-04
RT4	C1	90	21.12.2000	1.37E-04	-4.19E-03	1.24E-04
		105	21.12.2000	-9.65E-04	-4.36E-03	2.31E-05

2.2.2. Disturbing Torques when operating the SPT-100 thrusters during the orbit eccentricity control operations (Firings #1.7 and #1.8)

Values of the disturbing torques (M_x , M_y , M_z) observable when operating the SPT-100 thrusters are provided in Table 9.

Table 9

Thruster #	Cathode #	SA Angle (degrees)	Data (dd/mm/yy)	Disturbing Torque X (N·m)	Disturbing Torque Y (N·m)	Disturbing Torque Z (N·m)
RT1	C1	135-150	04/12/00	1.42E-03	-1.22E-04	-6.65E-04
RT2	C1	315-330	05/12/00	-1.06E-03	-2.63E-04	7.44E-05

2.2.3. Attitude Control Propulsion Subsystem

A propellant flow rate for the Express-A #3 Attitude Control Propulsion Subsystem in order to compensate the disturbing torques at the firings #1.1 through #1.9 is given in Table 10.

Table 10

Firing No	Thruster No	Propellant Flow Rate (grams)
1.1	T4C1	≈ 4,6
1.2	T4C1	≈ 4,8
1.3	RT4C1	≈ 5,3
1.4	T4C1	≈ 14,7
1.5	T4C1	≈ 7,3
1.6	RT4C1	≈ 13
1.7	RT1C1	≈ 0
1.8	RT2C1	≈ 2,5
1.9	RT4C1	≈ 8,6

2.3. Thermal Control Subsystem

Table 11 provides daily temperature change data (Parameters T18R and T19R) for the Radiator as well as for a surface of the Pressurized Container (T28K). The parameters were measured on December 21, 2000 with an interval of 60 min.

Table 11

Time (hh:mm:ss)	Cylindrical Radiator Temperature 1 (°C)	Cylindrical Radiator Temperature 2 (°C)	Pressurized Container Surface Temperature (°C)
00:00:00	-9,67	-17,26	16,04
01:00:01	-12,2	-18,95	16,04
02:00:01	-16,42	-21,48	15,38
03:00:01	-21,48	-23,17	15,05
04:00:01	-24,01	-21,48	14,39
05:00:01	-24,01	-18,95	14,39
06:00:01	-22,32	-14,73	14,06
07:00:01	-18,95	-11,36	14,06
08:00:01	-16,42	-8,83	14,39
09:00:00	-15,58	-5,45	14,39
10:00:00	-13,89	-4,61	14,39
11:00:00	-12,2	-3,77	14,39
12:00:00	-11,36	-3,77	14,72
13:00:00	-10,51	-3,77	14,72
14:00:00	-10,51	-5,45	14,72
15:00:01	-11,36	-8,83	14,72
16:00:01	-10,51	-10,51	15,38
17:00:01	-7,98	-11,36	15,71
18:00:00	-5,45	-10,51	16,37
19:00:00	-4,61	-10,51	16,04
20:00:01	-2,92	-7,14	16,37
21:00:01	-3,77	-12,2	16,37
22:00:01	-5,45	-13,89	16,7
23:00:01	-6,3	-14,73	16,37
16:00:01	-17,26	-23,17	14,39
17:00:01	-14,73	-23,17	14,06
18:00:01	-11,36	-21,48	14,39
19:00:01	-8,83	-19,79	15,05
20:00:01	-7,14	-18,11	15,38
21:00:01	-7,14	-18,95	15,71
22:00:01	-8,83	-20,64	16,04
23:00:01	-9,67	-22,32	16,37
23:59:59	-9,67	-20,64	16,37

2.4. On-Board Navigation Subsystem

Express-A #3 orbit parameters on the date of ranging session are provided in Table 12 below.

Table 12

Date of Ranging Session	Time (Moscow Standard Time)	Greenwich Longitude	Inclination
14.10.2000	02.14.06	11.00.36 W	00.03.17,5
28.10.2000	01.18.52	10.59.48 W	00.03.51,2
11.11.2000	00.23.54	10.59.04 W	00.03.57,6
27.11.2000	23.16.49	10.55.16 W	00.03.40,4
11.12.2000	22.22.19	11.03.29 W	00.03.26,2
25.12.2000	21.27.20	11.04.31 W	00.04.05,3

2.5. Communications Module

Within a period of 01/10/00 to 31/12/00 when firing the SPT-100 Thrusters no any facts of anomalous telemetry data receipt were registered.

Within a period of 01/10/00 to 31/12/00 when firing the SPT-100 thrusters, an influence of propulsion on the communications module transponders operation performance was not recorded.

Annex 1. T4C1 Thruster Operation TM-data based on available TM-data receipt sessions (06/10/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
20:39:54	0,00	0,00	0,00	2,81	
20:40:04	0,00	0,00	0,00	2,81	
20:40:14	0,00	0,00	0,00	2,81	
20:40:24	0,00	0,00	0,00	2,81	
20:40:34	0,00	0,00	0,00	2,81	
20:40:44	0,00	0,00	0,00	2,81	
20:40:54	0,00	0,00	0,00	2,81	
20:41:04	0,00	0,00	0,00	2,81	
20:41:14	0,00	0,00	0,00	2,81	
20:41:24	0,00	0,00	0,00	2,81	
20:41:34	0,00	0,00	0,00	2,81	
20:41:44	0,00	0,00	0,00	2,81	
20:41:54	0,00	0,00	0,00	2,81	
20:42:05	0,00	0,00	0,00	2,81	
20:42:14	0,00	0,00	0,00	2,81	
20:42:24	0,00	0,00	0,00	2,81	
20:42:34	0,00	0,00	0,00	2,81	
20:42:44	0,00	0,00	0,00	2,81	
20:42:54	11,90	0,00	326	2,81	
20:43:04	12,10	0,00	326	2,81	
20:43:14	12,00	0,00	326	2,81	
20:43:24	12,10	0,00	326	2,81	
20:43:34	12,00	0,00	326	2,81	
20:43:44	11,90	0,00	326	2,81	
20:43:54	12,00	0,00	326	2,81	
20:44:04	12,20	0,00	326	2,81	
20:44:14	12,10	0,00	326	2,81	
20:44:24	12,00	0,00	326	2,81	
20:44:35	12,00	0,00	326	2,81	
20:44:45	12,00	0,00	326	2,81	
20:44:54	12,00	0,00	326	2,81	
20:45:04	12,00	0,00	326	2,81	
20:45:14	12,20	0,00	326	2,81	
20:45:24	12,20	3,82	310	2,81	
20:45:34	0,00	4,46	308	2,78	
20:46:14	0,00	4,65	308	2,72	
20:46:34	0,00	4,87	308	2,72	
20:47:34	0,00	4,74	308	2,63	
20:48:14	0,00	4,68	305	2,78	
20:48:34	0,00	4,65	308	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
20:49:14	0,00	4,62	316	2,72	
20:49:34	0,00	4,62	310	2,66	
20:50:14	0,00	4,68	314	2,63	
20:50:34	0,00	4,65	310	2,63	
20:51:14	0,00	4,71	308	2,84	
20:51:34	0,00	4,62	310	2,78	
20:52:14	0,00	4,65	310	2,72	
20:52:34	0,00	4,65	318	2,72	
20:53:14	0,00	4,65	314	2,69	
20:53:34	0,00	4,74	310	2,63	
20:54:14	0,00	4,65	314	2,78	
20:54:34	0,00	4,68	316	2,84	
20:55:14	0,00	4,65	310	2,75	
20:55:34	0,00	4,65	310	2,69	
20:56:14	0,00	4,68	310	2,66	
20:56:34	0,00	4,65	318	2,63	
20:57:14	0,00	4,68	314	2,72	
20:58:14	0,00	4,65	310	2,75	
20:58:34	0,00	4,65	310	2,75	
20:59:14	0,00	4,65	310	2,69	
20:59:34	0,00	4,68	310	2,69	
21:00:14	0,00	4,77	310	2,63	
21:00:34	0,00	4,77	308	2,75	
21:01:14	0,00	4,68	310	2,78	
21:01:34	0,00	4,65	310	2,75	
21:02:14	0,00	4,68	308	2,69	
21:03:14	0,00	4,77	310	2,63	
21:03:34	0,00	4,62	316	2,69	
21:04:14	0,00	4,77	310	2,81	
21:04:34	0,00	4,65	308	2,78	
21:05:14	0,00	4,68	310	2,66	
21:06:14	0,00	4,74	308	2,63	
21:06:34	0,00	4,65	310	2,60	
21:07:14	0,00	4,68	310	2,84	
21:07:34	0,00	4,77	310	2,78	
21:08:14	0,00	4,65	308	2,72	
21:08:34	0,00	4,65	308	2,72	
21:09:14	0,00	4,65	310	2,66	
21:09:34	0,00	4,65	310	2,63	
21:10:14	0,00	4,68	310	2,84	
21:10:34	0,00	4,65	316	2,81	
21:11:14	0,00	4,65	316	2,75	
21:11:34	0,00	4,65	318	2,72	
21:12:14	0,00	4,62	310	2,66	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
21:12:34	0,00	4,65	318	2,66	
21:13:14	0,00	4,77	310	2,75	
21:13:34	0,00	4,74	308	2,84	
21:14:14	0,00	4,65	310	2,75	
21:14:34	0,00	4,65	310	2,72	
21:15:14	0,00	4,62	314	2,69	
21:16:14	0,00	4,77	310	2,63	
21:16:34	0,00	4,68	310	2,78	
21:17:14	0,00	4,62	310	2,78	
21:17:34	0,00	4,62	310	2,75	
21:18:14	0,00	4,74	308	2,69	
21:18:34	0,00	4,65	318	2,66	
21:19:14	0,00	4,74	308	2,63	
21:19:34	0,00	4,74	308	2,72	
21:20:14	0,00	4,62	310	2,81	
21:21:14	0,00	4,62	310	2,72	
21:21:34	0,00	4,62	310	2,66	
21:22:14	0,00	4,62	310	2,63	
21:22:34	0,00	4,62	318	2,60	
21:23:34	0,00	4,65	314	2,78	
21:24:14	0,00	4,62	310	2,72	
21:24:34	0,00	4,62	308	2,69	
21:25:14	0,00	4,74	308	2,66	
21:25:34	0,00	4,65	308	2,66	
21:26:14	0,00	4,65	318	2,81	
21:26:34	0,00	4,65	310	2,84	
21:27:14	0,00	4,62	310	2,75	
21:27:34	0,00	4,65	308	2,72	
21:28:14	0,00	4,62	318	2,66	
21:28:34	0,00	4,65	308	2,66	
21:29:14	0,00	4,62	308	2,72	
21:29:34	0,00	4,62	308	2,84	
21:30:14	0,00	4,65	308	2,75	
21:30:34	0,00	4,65	308	2,75	
21:31:14	0,00	4,65	308	2,69	
21:31:34	0,00	4,65	314	2,66	
21:32:14	0,00	4,65	308	2,63	
21:32:34	0,00	4,65	310	2,78	
21:33:14	0,00	4,62	310	2,78	
21:34:14	0,00	4,68	310	2,69	
21:34:34	0,00	4,71	308	2,69	
21:35:14	0,00	4,65	308	2,63	
21:35:34	0,00	4,71	308	2,66	
21:36:14	0,00	4,68	308	2,81	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
21:36:34	0,00	4,74	310	2,78	
21:37:14	0,00	4,62	308	2,72	
21:37:34	0,00	4,68	308	2,69	
21:38:14	0,00	4,65	310	2,63	
21:39:14	0,00	4,71	308	2,84	
21:39:34	0,00	4,77	310	2,81	
21:40:14	0,00	4,65	312	2,75	
21:40:34	0,00	4,65	318	2,72	
21:41:34	0,00	4,68	308	2,63	
21:42:14	0,00	4,65	308	2,78	
21:42:34	0,00	4,62	310	2,84	
21:43:14	0,00	4,62	310	2,75	
21:43:34	0,00	4,65	314	2,72	
21:44:14	0,00	4,71	308	2,66	
21:44:34	0,00	4,65	308	2,66	
21:45:14	0,00	4,62	310	2,66	
21:45:34	0,00	4,65	310	2,84	
21:46:14	0,00	4,62	310	2,78	
21:46:34	0,00	4,65	314	2,78	
21:47:14	0,00	4,74	308	2,69	
21:47:34	0,00	4,77	310	2,66	
21:48:14	0,00	4,65	308	2,60	
21:48:34	0,00	4,65	308	2,75	
21:49:14	0,00	4,65	316	2,78	
21:49:34	0,00	4,65	308	2,78	
21:50:14	0,00	4,65	316	2,72	
21:50:34	0,00	4,71	308	2,66	
21:51:14	0,00	4,77	308	2,63	
21:52:14	0,00	4,65	308	2,84	
21:52:34	0,00	4,65	308	2,78	
21:53:14	0,00	4,65	310	2,72	
21:53:34	0,00	4,74	308	2,69	
21:54:14	0,00	4,74	308	2,63	
21:54:34	0,00	4,65	326	2,63	
21:55:14	0,00	4,71	308	2,84	
21:55:34	0,00	4,62	312	2,81	
21:56:14	0,00	4,74	310	2,75	
21:56:34	0,00	0,00	0	2,72	
21:57:14	0,00	0,00	0	2,72	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)			Temperature (°C)				
20:31:45	56,36	4,88	3,87	10,10	10,63	9,58	9,00	11,36
21:38:46	56,36	4,88	3,87	10,10	10,63	9,58	9,00	14,68
21:51:41	56,36	4,81	3,87	10,10	10,63	9,58	9,00	14,68
21:52:15	56,36	4,95	3,87	10,10	10,63	9,58	9,00	14,68
21:55:07	56,36	4,74	3,87	10,10	10,63	9,58	9,00	14,68
21:55:23	56,36	4,88	3,87	10,10	10,63	9,58	9,00	14,68

Annex 2. T4C1 Thruster Operation TM-data based on available TM-data receipt sessions (27/10/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:18:06	0,00	0,00	0,00	2,81	
19:18:16	0,00	0,00	0,00	2,81	
19:18:26	0,00	0,00	0,00	2,81	
19:18:36	0,00	0,00	0,00	2,81	
19:18:46	0,00	0,00	0,00	2,81	
19:18:56	0,00	0,00	0,00	2,81	
19:19:06	0,00	0,00	0,00	2,81	
19:19:16	0,00	0,00	0,00	2,81	
19:19:26	0,00	0,00	0,00	2,81	
19:19:36	0,00	0,00	0,00	2,81	
19:19:46	0,00	0,00	0,00	2,81	
19:19:56	0,00	0,00	0,00	2,81	
19:20:06	0,00	0,00	0,00	2,81	
19:20:16	0,00	0,00	324	2,81	
19:20:26	12,00	0,00	326	2,81	
19:20:36	12,00	0,00	326	2,81	
19:20:46	12,20	0,00	326	2,81	
19:20:56	12,10	0,00	322	2,81	
19:21:06	12,00	0,00	326	2,81	
19:21:16	12,00	0,00	324	2,81	
19:21:26	12,00	0,00	324	2,81	
19:21:36	12,10	0,00	326	2,81	
19:21:46	12,00	0,00	326	2,81	
19:21:56	12,20	0,00	326	2,81	
19:22:06	12,00	0,00	326	2,81	
19:22:16	12,10	0,00	324	2,81	
19:22:26	12,00	0,00	326	2,81	
19:22:36	12,00	0,00	326	2,81	
19:22:46	12,00	0,00	326	2,81	
19:22:56	12,00	0,00	326	2,81	
19:23:06	0,00	3,52	310	2,78	
19:23:36	0,00	4,09	310	2,75	
19:24:06	0,00	4,59	308	2,69	
19:24:36	0,00	4,74	308	2,66	
19:25:06	0,00	4,65	316	2,63	
19:25:36	0,00	4,65	308	2,72	
19:26:06	0,00	4,65	308	2,84	
19:26:36	0,00	4,74	308	2,75	
19:27:06	0,00	4,65	316	2,72	
19:27:36	0,00	4,68	310	2,66	
19:28:06	0,00	4,87	310	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:28:36	0,00	4,77	308	2,63	
19:29:06	0,00	4,77	308	2,63	
19:29:36	0,00	4,65	308	2,78	
19:30:06	0,00	4,65	310	2,75	
19:30:36	0,00	4,65	314	2,69	
19:31:06	0,00	4,65	310	2,69	
19:32:06	0,00	4,74	310	2,78	
19:32:36	0,00	4,62	310	2,81	
19:33:06	0,00	4,65	310	2,75	
19:33:36	0,00	4,65	310	2,72	
19:34:06	0,00	4,65	318	2,63	
19:35:06	0,00	4,65	308	2,69	
19:35:36	0,00	4,68	314	2,81	
19:36:06	0,00	4,65	310	2,75	
19:36:36	0,00	4,74	308	2,72	
19:37:06	0,00	4,65	318	2,66	
19:37:36	0,00	4,68	310	2,66	
19:38:06	0,00	4,77	310	2,60	
19:38:36	0,00	4,71	308	2,84	
19:39:06	0,00	4,74	308	2,78	
19:39:36	0,00	4,62	308	2,75	
19:40:06	0,00	4,68	310	2,72	
19:40:36	0,00	4,68	314	2,66	
19:41:06	0,00	4,65	310	2,63	
19:41:36	0,00	4,74	308	2,75	
19:42:06	0,00	4,65	318	2,84	
19:42:36	0,00	4,71	310	2,75	
19:43:06	0,00	4,65	318	2,72	
19:43:36	0,00	4,68	308	2,66	
19:44:06	0,00	4,68	308	2,63	
19:44:36	0,00	4,77	310	2,66	
19:45:06	0,00	4,62	310	2,84	
19:45:36	0,00	4,74	308	2,78	
19:46:06	0,00	4,65	308	2,75	
19:46:36	0,00	4,65	318	2,69	
19:47:06	0,00	4,62	310	2,63	
19:48:06	0,00	4,65	310	2,78	
19:48:36	0,00	4,65	318	2,84	
19:49:06	0,00	4,65	316	2,72	
19:50:06	0,00	4,77	310	2,69	
19:50:36	0,00	4,62	314	2,63	
19:51:06	0,00	4,62	312	2,72	
19:51:36	0,00	4,68	308	2,84	
19:52:36	0,00	4,77	308	2,72	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:53:06	0,00	4,77	310	2,66	
19:53:36	0,00	4,68	310	2,66	
19:54:06	0,00	4,74	308	2,60	
19:54:36	0,00	4,74	308	2,84	
19:55:06	0,00	4,77	308	2,78	
19:55:36	0,00	4,68	308	2,75	
19:56:06	0,00	4,65	308	2,72	
19:56:36	0,00	4,65	326	2,66	
19:57:06	0,00	4,62	310	2,60	
19:57:36	0,00	4,65	310	2,75	
19:58:06	0,00	4,65	308	2,81	
19:58:36	0,00	4,65	316	2,75	
19:59:06	0,00	4,77	310	2,72	
19:59:36	0,00	4,62	310	2,66	
20:00:06	0,00	4,65	308	2,63	
20:00:36	0,00	4,62	310	2,66	
20:01:06	0,00	4,65	318	2,84	
20:01:36	0,00	4,65	314	2,78	
20:02:06	0,00	4,71	308	2,72	
20:02:36	0,00	4,62	310	2,69	
20:03:06	0,00	4,68	308	2,66	
20:03:36	0,00	4,65	308	2,63	
20:04:06	0,00	4,74	308	2,81	
20:04:36	0,00	4,65	316	2,78	
20:05:36	0,00	4,77	310	2,72	
20:06:06	0,00	4,87	310	2,66	
20:06:36	0,00	4,62	310	2,63	
20:07:06	0,00	4,65	314	2,72	
20:08:06	0,00	4,77	310	2,75	
20:08:36	0,00	4,62	310	2,72	
20:09:06	0,00	4,65	318	2,69	
20:09:36	0,00	4,68	310	2,66	
20:10:36	0,00	4,77	308	2,84	
20:11:06	0,00	4,65	316	2,78	
20:11:36	0,00	4,77	310	2,75	
20:12:06	0,00	4,65	310	2,69	
20:12:36	0,00	4,65	308	2,66	
20:13:06	0,00	4,62	318	2,63	
20:13:36	0,00	4,65	308	2,75	
20:14:06	0,00	4,62	308	2,81	
20:14:36	0,00	4,65	316	2,75	
20:15:06	0,00	4,74	310	2,72	
20:15:36	0,00	4,65	308	2,69	
20:16:06	0,00	4,74	308	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
20:16:36	0,00	4,77	308	2,66	
20:17:06	0,00	4,74	308	2,84	
20:17:36	0,00	4,65	308	2,78	
20:18:06	0,00	4,62	310	2,72	
20:18:36	0,00	4,62	318	2,69	
20:19:06	0,00	4,65	316	2,66	
20:19:36	0,00	4,65	318	2,63	
20:20:06	0,00	4,87	310	2,81	
20:20:36	0,00	4,65	308	2,78	
20:21:06	0,00	4,65	308	2,75	
20:21:36	0,00	4,65	308	2,72	
20:22:06	0,00	4,77	308	2,66	
20:22:36	0,00	4,74	308	2,63	
20:23:06	0,00	4,74	308	2,84	
20:24:06	0,00	4,77	308	2,75	
20:24:36	0,00	4,77	310	2,72	
20:25:06	0,00	4,65	308	2,69	
20:25:36	0,00	4,65	308	2,69	
20:26:06	0,00	4,65	310	2,60	
20:26:36	0,00	4,62	318	2,84	
20:27:06	0,00	4,74	310	2,78	
20:27:36	0,00	4,65	308	2,75	
20:28:06	0,00	4,65	308	2,69	
20:28:36	0,00	4,65	308	2,69	
20:29:06	0,00	4,77	308	2,63	
20:29:36	0,00	4,65	308	2,75	
20:30:06	0,00	4,65	308	2,84	
20:30:36	0,00	4,65	308	2,75	
20:31:06	0,00	4,77	308	2,75	
20:31:36	0,00	4,77	310	2,72	
20:32:06	0,00	4,65	308	2,69	
20:32:36	0,00	4,65	310	2,60	
20:33:06	0,00	4,62	318	2,84	
20:33:36	0,00	4,74	310	2,78	
20:34:06	0,00	0,00	0,00	2,75	
20:34:36	0,00	0,00	0,00	2,75	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)				Temperature (°C)			
19:19:45	57,68	4,88	3,95	10,63	11,15	11,15	10,05	15,35
20:18:08	57,68	4,88	3,95	10,63	11,15	11,15	10,05	18,68
20:29:30	57,68	4,88	3,95	10,63	11,15	11,15	10,05	18,68
20:30:00	57,68	4,95	3,95	10,63	11,15	11,15	10,05	18,68
20:32:43	57,68	4,81	3,95	10,63	11,15	11,15	10,05	18,68
20:33:09	57,68	4,88	3,95	10,63	11,15	11,15	10,05	18,68

Annex 3. RT4C1 Thruster Operation TM-data based on available TM-data receipt sessions (31/10/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:01:36	0,00	0,00	0,00	2,81	
19:01:46	0,00	0,00	0,00	2,81	
19:01:56	0,00	0,00	0,00	2,81	
19:02:06	0,00	0,00	0,00	2,81	
19:02:16	0,00	0,00	0,00	2,81	
19:02:26	0,00	0,00	0,00	2,81	
19:02:36	0,00	0,00	0,00	2,81	
19:02:46	0,00	0,00	0,00	2,81	
19:02:56	0,00	0,00	0,00	2,81	
19:03:06	0,00	0,00	0,00	2,81	
19:03:16	0,00	0,00	0,00	2,81	
19:03:26	0,00	0,00	0,00	2,81	
19:03:36	0,00	0,00	0,00	2,81	
19:03:46	0,00	0,00	0,00	2,81	
19:03:56	0,00	0,00	0,00	2,81	
19:04:06	0,00	0,00	0,00	2,81	
19:04:16	0,00	0,00	328	2,81	
19:04:26	12,10	0,00	322	2,81	
19:04:36	11,90	0,00	322	2,81	
19:04:46	12,00	0,00	322	2,81	
19:04:56	12,00	0,00	322	2,81	
19:05:06	12,00	0,00	322	2,81	
19:05:16	11,90	0,00	322	2,81	
19:05:26	12,00	0,00	322	2,81	
19:05:36	12,00	0,00	322	2,81	
19:05:46	12,00	0,00	322	2,81	
19:05:56	12,30	0,00	322	2,81	
19:06:06	12,20	0,00	322	2,81	
19:06:16	12,10	0,00	322	2,81	
19:06:26	12,10	0,00	322	2,81	
19:06:36	12,10	0,00	322	2,81	
19:06:46	12,00	0,00	322	2,81	
19:06:56	12,00	0,00	322	2,81	
19:07:06	0,00	3,82	308	2,78	
19:07:16	0,00	4,56	308	2,75	
19:07:46	0,00	4,59	308	2,72	
19:08:16	0,00	4,65	310	2,66	
19:08:46	0,00	4,62	308	2,66	
19:09:16	0,00	4,65	312	2,81	
19:09:46	0,00	4,62	314	2,78	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:10:16	0,00	4,65	310	2,72	
19:10:46	0,00	4,74	310	2,69	
19:11:16	0,00	4,65	308	2,66	
19:11:46	0,00	4,65	308	2,60	
19:12:16	0,00	4,68	308	2,84	
19:12:46	0,00	4,68	308	2,78	
19:13:16	0,00	4,65	308	2,75	
19:13:46	0,00	4,65	308	2,69	
19:14:16	0,00	4,68	308	2,66	
19:14:46	0,00	4,68	308	2,63	
19:15:16	0,00	4,62	305	2,75	
19:15:46	0,00	4,65	318	2,81	
19:16:16	0,00	4,65	308	2,72	
19:16:46	0,00	4,65	308	2,69	
19:17:16	0,00	4,62	310	2,66	
19:17:46	0,00	4,68	305	2,63	
19:18:16	0,00	4,65	308	2,72	
19:19:16	0,00	4,62	308	2,75	
19:19:46	0,00	4,62	308	2,72	
19:20:16	0,00	4,71	308	2,66	
19:20:46	0,00	4,62	308	2,63	
19:21:16	0,00	4,68	308	2,84	
19:22:16	0,00	4,65	308	2,78	
19:22:46	0,00	4,65	308	2,72	
19:23:16	0,00	4,62	308	2,69	
19:23:46	0,00	4,62	308	2,69	
19:24:16	0,00	4,65	314	2,63	
19:24:46	0,00	4,65	318	2,78	
19:25:16	0,00	4,62	308	2,81	
19:25:46	0,00	4,68	310	2,75	
19:26:16	0,00	4,65	310	2,72	
19:26:46	0,00	4,65	308	2,66	
19:27:16	0,00	4,65	318	2,63	
19:27:46	0,00	4,62	308	2,72	
19:28:16	0,00	4,62	310	2,84	
19:28:46	0,00	4,65	308	2,75	
19:29:16	0,00	4,62	308	2,72	
19:29:46	0,00	4,62	308	2,66	
19:30:16	0,00	4,62	308	2,66	
19:30:46	0,00	4,65	308	2,63	
19:31:16	0,00	4,62	310	2,84	
19:31:46	0,00	4,62	308	2,78	
19:32:16	0,00	4,65	316	2,75	
19:32:46	0,00	4,62	308	2,69	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:33:16	0,00	4,77	308	2,66	
19:33:46	0,00	4,65	308	2,63	
19:34:46	0,00	4,65	308	2,81	
19:35:16	0,00	4,65	308	2,72	
19:35:46	0,00	4,65	308	2,72	
19:36:16	0,00	4,65	308	2,66	
19:37:16	0,00	4,77	308	2,69	
19:37:46	0,00	4,62	308	2,84	
19:38:16	0,00	4,62	308	2,75	
19:38:46	0,00	4,62	308	2,72	
19:39:46	0,00	4,62	310	2,66	
19:40:16	0,00	4,74	310	2,60	
19:40:46	0,00	4,65	308	2,84	
19:41:16	0,00	4,74	308	2,78	
19:41:46	0,00	4,65	316	2,75	
19:42:16	0,00	4,65	308	2,72	
19:42:46	0,00	4,62	308	2,66	
19:43:16	0,00	4,65	308	2,63	
19:43:46	0,00	4,65	305	2,75	
19:44:16	0,00	4,62	308	2,81	
19:44:46	0,00	4,77	308	2,75	
19:45:16	0,00	4,62	308	2,72	
19:45:46	0,00	4,77	308	2,66	
19:46:16	0,00	4,68	308	2,63	
19:46:46	0,00	4,65	305	2,66	
19:47:16	0,00	4,65	308	2,84	
19:47:46	0,00	4,62	308	2,78	
19:48:16	0,00	4,65	316	2,72	
19:48:46	0,00	4,62	308	2,69	
19:49:16	0,00	4,65	308	2,63	
19:49:46	0,00	4,62	310	2,60	
19:50:16	0,00	4,62	308	2,84	
19:50:46	0,00	4,77	308	2,78	
19:51:16	0,00	4,65	305	2,75	
19:51:46	0,00	4,62	310	2,72	
19:52:46	0,00	4,62	308	2,63	
19:53:16	0,00	4,62	318	2,75	
19:53:46	0,00	4,65	310	2,84	
19:54:16	0,00	4,65	308	2,75	
19:55:16	0,00	4,62	308	2,69	
19:55:46	0,00	4,65	308	2,63	
19:56:16	0,00	4,62	308	2,69	
19:56:46	0,00	4,77	312	2,84	
19:57:46	0,00	4,62	310	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:58:16	0,00	4,65	308	2,72	
19:58:46	0,00	4,65	308	2,66	
19:59:16	0,00	4,62	308	2,63	
19:59:46	0,00	4,59	318	2,81	
20:00:16	0,00	4,62	308	2,78	
20:00:46	0,00	4,65	316	2,75	
20:01:16	0,00	4,65	316	2,72	
20:01:46	0,00	4,65	318	2,66	
20:02:16	0,00	4,62	310	2,63	
20:02:46	0,00	4,74	308	2,72	
20:03:16	0,00	4,65	308	2,84	
20:03:46	0,00	4,65	308	2,75	
20:04:16	0,00	4,65	308	2,72	
20:04:46	0,00	4,77	308	2,66	
20:05:16	0,00	4,65	314	2,63	
20:05:46	0,00	4,62	308	2,63	
20:06:16	0,00	4,62	310	2,84	
20:06:46	0,00	4,65	310	2,78	
20:07:16	0,00	4,65	310	2,75	
20:07:46	0,00	4,65	308	2,69	
20:08:16	0,00	4,62	308	2,69	
20:08:46	0,00	4,62	308	2,63	
20:09:16	0,00	4,65	308	2,78	
20:09:46	0,00	4,65	308	2,81	
20:10:46	0,00	4,65	310	2,72	
20:11:16	0,00	4,65	310	2,69	
20:11:46	0,00	4,62	310	2,63	
20:12:16	0,00	4,62	310	2,69	
20:13:16	0,00	4,62	310	2,78	
20:13:46	0,00	4,65	308	2,72	
20:14:16	0,00	4,65	308	2,69	
20:14:46	0,00	4,62	308	2,66	
20:15:46	0,00	4,77	308	2,84	
20:16:16	0,00	4,65	310	2,78	
20:16:46	0,00	4,65	318	2,75	
20:17:16	0,00	4,65	316	2,72	
20:17:46	0,00	4,71	308	2,66	
20:18:16	0,00	0,00	0,00	2,63	
20:18:46	0,00	0,00	0,00	2,63	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)				Temperature (°C)			
19:01:24	59,00	4,88	3,95	10,63	11,15	11,68	9,53	16,01
19:53:39	59,00	4,88	3,95	10,63	11,15	11,68	9,53	19,34
20:12:19	59,00	4,81	3,95	10,63	11,15	11,68	9,53	19,34
20:12:54	59,00	4,95	3,95	10,63	11,15	11,68	9,53	19,34
20:15:31	59,00	4,74	3,95	10,63	11,15	11,68	9,53	19,34
20:15:55	59,00	4,88	3,95	10,63	11,15	11,68	9,53	19,34

Annex 4. T4C1 Thruster Operation TM-data based on available TM-data receipt sessions (15/11/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
16:52:44	0,00	0,00	0,00	2,81	
16:52:54	0,00	0,00	0,00	2,81	
16:53:04	0,00	0,00	0,00	2,81	
16:53:14	0,00	0,00	0,00	2,81	
16:53:24	0,00	0,00	0,00	2,81	
16:53:34	0,00	0,00	0,00	2,81	
16:53:44	0,00	0,00	0,00	2,81	
16:53:54	0,00	0,00	0,00	2,81	
16:54:04	0,00	0,00	0,00	2,81	
16:54:14	0,00	0,00	0,00	2,81	
16:54:24	0,00	0,00	326	2,81	
16:54:34	11,90	0,00	326	2,81	
16:54:44	12,00	0,00	326	2,81	
16:54:54	12,00	0,00	326	2,81	
16:55:04	12,00	0,00	326	2,81	
16:55:14	12,00	0,00	326	2,81	
16:55:24	11,90	0,00	326	2,81	
16:55:34	12,30	0,00	324	2,81	
16:55:45	12,10	0,00	326	2,81	
16:55:54	12,10	0,00	328	2,81	
16:56:04	12,00	0,00	326	2,81	
16:56:14	12,00	0,00	326	2,81	
16:56:24	12,00	0,00	326	2,81	
16:56:34	12,00	0,00	326	2,81	
16:56:44	12,00	0,00	328	2,81	
16:56:54	12,10	0,00	326	2,81	
16:57:04	12,20	0,00	326	2,81	
16:57:14	0,00	4,40	318	2,78	
16:57:44	0,00	4,65	308	2,75	
16:58:14	0,00	4,50	310	2,72	
16:58:44	0,00	4,59	310	2,66	
16:59:14	0,00	4,65	318	2,63	
16:59:44	0,00	4,65	308	2,63	
17:00:14	0,00	4,65	308	2,84	
17:00:44	0,00	4,71	308	2,78	
17:01:14	0,00	4,65	310	2,72	
17:01:44	0,00	4,68	308	2,72	
17:02:14	0,00	4,74	308	2,66	
17:02:44	0,00	4,68	318	2,63	
17:03:14	0,00	4,77	310	2,75	
17:03:44	0,00	4,65	316	2,81	
17:04:14	0,00	4,68	308	2,75	
17:04:44	0,00	4,62	310	2,72	
17:05:14	0,00	4,74	308	2,69	
17:05:44	0,00	4,68	318	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:06:14	0,00	4,65	310	2,72	
17:06:44	0,00	4,65	316	2,84	
17:07:14	0,00	4,65	312	2,78	
17:07:44	0,00	4,68	314	2,72	
17:08:14	0,00	4,65	314	2,69	
17:08:44	0,00	4,65	316	2,66	
17:09:14	0,00	4,65	318	2,63	
17:09:44	0,00	4,65	308	2,84	
17:10:14	0,00	4,68	310	2,78	
17:10:44	0,00	4,65	316	2,72	
17:11:14	0,00	4,62	310	2,69	
17:11:44	0,00	4,65	310	2,66	
17:12:14	0,00	4,65	310	2,63	
17:12:44	0,00	4,68	310	2,81	
17:13:14	0,00	4,65	318	2,81	
17:14:14	0,00	4,65	314	2,75	
17:14:44	0,00	4,77	308	2,69	
17:15:14	0,00	4,77	310	2,63	
17:15:44	0,00	4,65	316	2,72	
17:16:14	0,00	4,65	308	2,84	
17:16:44	0,00	4,62	310	2,75	
17:17:14	0,00	4,65	308	2,72	
17:17:44	0,00	4,77	308	2,69	
17:18:14	0,00	4,68	310	2,63	
17:18:44	0,00	4,65	308	2,63	
17:19:14	0,00	4,77	310	2,84	
17:19:44	0,00	4,65	310	2,78	
17:20:14	0,00	4,65	308	2,75	
17:20:44	0,00	4,68	310	2,72	
17:21:14	0,00	4,65	314	2,66	
17:21:44	0,00	4,71	310	2,63	
17:22:14	0,00	4,62	326	2,78	
17:22:44	0,00	4,68	314	2,81	
17:23:14	0,00	4,62	308	2,75	
17:23:44	0,00	4,65	310	2,72	
17:24:14	0,00	4,65	308	2,69	
17:24:44	0,00	4,62	310	2,63	
17:25:14	0,00	4,65	308	2,72	
17:25:44	0,00	4,68	308	2,84	
17:26:14	0,00	4,65	308	2,75	
17:26:44	0,00	4,62	310	2,72	
17:27:14	0,00	4,65	308	2,66	
17:27:44	0,00	4,65	316	2,66	
17:28:14	0,00	4,65	308	2,63	
17:28:44	0,00	4,71	308	2,84	
17:29:14	0,00	4,65	310	2,78	
17:29:44	0,00	4,65	316	2,75	
17:30:14	0,00	4,77	310	2,72	
17:30:44	0,00	4,65	314	2,69	
17:31:14	0,00	4,65	308	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:32:14	0,00	4,74	308	2,81	
17:32:44	0,00	4,77	308	2,75	
17:33:14	0,00	4,65	308	2,72	
17:33:44	0,00	4,65	318	2,66	
17:34:14	0,00	4,62	314	2,63	
17:34:44	0,00	4,65	308	2,72	
17:35:14	0,00	4,62	310	2,84	
17:35:44	0,00	4,71	308	2,75	
17:36:14	0,00	4,68	308	2,72	
17:36:44	0,00	4,68	310	2,69	
17:37:14	0,00	4,65	308	2,66	
17:37:44	0,00	4,65	316	2,63	
17:38:14	0,00	4,77	310	2,84	
17:38:44	0,00	4,87	308	2,78	
17:39:14	0,00	4,65	316	2,75	
17:39:44	0,00	4,65	308	2,72	
17:40:14	0,00	4,65	318	2,66	
17:40:44	0,00	4,71	308	2,63	
17:41:14	0,00	4,68	310	2,78	
17:41:44	0,00	4,62	310	2,84	
17:42:14	0,00	4,74	308	2,75	
17:42:44	0,00	4,71	310	2,72	
17:43:14	0,00	4,71	308	2,66	
17:43:44	0,00	4,77	310	2,63	
17:44:14	0,00	4,77	308	2,72	
17:44:44	0,00	4,65	308	2,84	
17:45:14	0,00	4,62	310	2,78	
17:45:44	0,00	4,71	308	2,72	
17:46:14	0,00	4,65	318	2,69	
17:46:44	0,00	4,65	308	2,66	
17:47:14	0,00	4,65	308	2,63	
17:47:44	0,00	4,65	316	2,87	
17:48:14	0,00	4,65	308	2,78	
17:48:44	0,00	4,68	314	2,72	
17:49:14	0,00	4,65	308	2,72	
17:50:14	0,00	4,62	310	2,63	
17:50:44	0,00	4,77	310	2,75	
17:51:14	0,00	4,62	310	2,84	
17:51:44	0,00	4,62	308	2,72	
17:52:14	0,00	4,62	314	2,72	
17:52:44	0,00	4,71	308	2,66	
17:53:14	0,00	4,62	308	2,63	
17:53:44	0,00	4,65	316	2,69	
17:54:14	0,00	4,62	326	2,84	
17:54:44	0,00	4,71	308	2,78	
17:55:14	0,00	4,62	326	2,75	
17:55:44	0,00	4,74	308	2,69	
17:56:14	0,00	4,62	318	2,66	
17:56:44	0,00	4,74	308	2,60	
17:57:14	0,00	4,65	310	2,84	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:57:44	0,00	4,65	314	2,78	
17:58:14	0,00	4,62	310	2,75	
17:58:44	0,00	4,87	310	2,72	
17:59:14	0,00	4,65	310	2,66	
17:59:44	0,00	4,77	308	2,63	
18:00:14	0,00	4,62	310	2,75	
18:00:44	0,00	4,68	310	2,84	
18:01:14	0,00	4,65	310	2,75	
18:01:44	0,00	4,74	308	2,72	
18:02:14	0,00	4,65	308	2,66	
18:02:44	0,00	4,68	308	2,66	
18:03:14	0,00	4,77	310	2,63	
18:03:44	0,00	4,65	316	2,84	
18:04:14	0,00	4,62	314	2,78	
18:04:44	0,00	4,74	308	2,75	
18:05:14	0,00	4,62	308	2,69	
18:05:44	0,00	4,65	308	2,69	
18:06:14	0,00	4,65	314	2,63	
18:06:44	0,00	4,65	308	2,81	
18:07:14	0,00	4,74	308	2,81	
18:08:14	0,00	4,65	318	2,72	
18:08:44	0,00	4,62	308	2,66	
18:09:14	0,00	4,62	310	2,63	
18:09:44	0,00	4,65	310	2,72	
18:10:14	0,00	4,62	308	2,84	
18:10:44	0,00	4,62	310	2,75	
18:11:14	0,00	4,65	316	2,72	
18:11:44	0,00	4,62	316	2,69	
18:12:14	0,00	4,62	308	2,66	
18:12:44	0,00	4,74	308	2,63	
18:13:14	0,00	4,65	308	2,84	
18:13:44	0,00	4,65	308	2,78	
18:14:14	0,00	4,65	316	2,75	
18:14:44	0,00	4,87	308	2,72	
18:15:14	0,00	4,62	312	2,66	
18:15:44	0,00	4,68	310	2,63	
18:16:14	0,00	4,65	316	2,75	
18:16:44	0,00	4,62	310	2,81	
18:17:14	0,00	4,74	308	2,75	
18:17:44	0,00	4,65	308	2,69	
18:18:14	0,00	4,65	308	2,69	
18:18:44	0,00	4,71	308	2,63	
18:19:14	0,00	4,68	308	2,69	
18:19:44	0,00	4,68	308	2,84	
18:20:14	0,00	4,68	308	2,78	
18:21:14	0,00	4,87	310	2,69	
18:21:44	0,00	4,65	308	2,66	
18:22:14	0,00	4,68	308	2,60	
18:22:44	0,00	4,65	310	2,84	
18:23:44	0,00	4,77	308	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:24:14	0,00	4,65	308	2,72	
18:24:44	0,00	4,65	316	2,69	
18:25:14	0,00	4,62	308	2,63	
18:26:14	0,00	4,62	318	2,84	
18:26:44	0,00	4,74	308	2,75	
18:27:14	0,00	4,68	310	2,72	
18:27:44	0,00	4,74	308	2,69	
18:28:14	0,00	4,65	310	2,66	
18:28:44	0,00	4,68	310	2,63	
18:29:14	0,00	4,77	308	2,84	
18:29:44	0,00	4,65	318	2,78	
18:30:14	0,00	4,65	308	2,78	
18:30:44	0,00	4,62	318	2,72	
18:31:14	0,00	4,65	314	2,66	
18:31:44	0,00	4,62	318	2,63	
18:32:14	0,00	4,77	308	2,78	
18:32:44	0,00	4,74	308	2,81	
18:33:14	0,00	4,77	310	2,75	
18:33:44	0,00	4,65	308	2,72	
18:34:14	0,00	4,65	310	2,66	
18:34:44	0,00	4,65	308	2,63	
18:35:14	0,00	4,74	308	2,69	
18:35:44	0,00	4,65	308	2,84	
18:36:14	0,00	4,74	310	2,78	
18:36:44	0,00	4,68	310	2,72	
18:37:14	0,00	4,68	310	2,69	
18:37:44	0,00	4,68	314	2,66	
18:38:14	0,00	4,65	308	2,63	
18:39:14	0,00	4,65	314	2,78	
18:39:44	0,00	4,62	308	2,78	
18:40:14	0,00	4,62	326	2,69	
18:40:44	0,00	4,65	316	2,69	
18:41:14	0,00	4,71	308	2,75	
18:42:14	0,00	4,65	310	2,84	
18:42:44	0,00	4,74	310	2,72	
18:43:14	0,00	4,77	310	2,72	
18:44:14	0,00	4,62	308	2,63	
18:44:44	0,00	4,77	308	2,63	
18:45:14	0,00	4,62	308	2,84	
18:45:44	0,00	4,77	310	2,75	
18:46:14	0,00	4,68	310	2,75	
18:46:44	0,00	4,65	310	2,72	
18:47:14	0,00	4,68	308	2,69	
18:47:44	0,00	4,65	310	2,63	
18:48:14	0,00	4,65	305	2,81	
18:48:44	0,00	4,65	314	2,84	
18:49:14	0,00	4,77	308	2,75	
18:49:44	0,00	4,77	308	2,72	
18:50:14	0,00	4,65	310	2,66	
18:50:44	0,00	4,87	310	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:51:14	0,00	4,62	310	2,69	
18:51:44	0,00	4,65	314	2,84	
18:52:14	0,00	4,77	308	2,78	
18:52:44	0,00	4,74	308	2,72	
18:53:14	0,00	4,62	308	2,69	
18:53:44	0,00	4,65	308	2,66	
18:54:14	0,00	4,68	310	2,60	
18:54:44	0,00	4,68	310	2,84	
18:55:14	0,00	4,65	314	2,81	
18:55:44	0,00	4,62	308	2,75	
18:56:14	0,00	4,74	308	2,72	
18:57:14	0,00	0,00	0,00	2,63	
18:57:44	0,00	0,00	0,00	2,63	
18:58:14	0,00	0,00	0,00	2,63	
18:58:44	0,00	0,00	0,00	2,63	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
Pressure (kgf/cm ²)				Temperature (°C)				
16:52:37	61,63	4,88	3,95	12,72	11,15	12,72	12,15	18,01
17:51:13	61,63	4,88	3,95	12,72	11,15	12,72	12,15	21,34
18:34:48	61,63	4,88	3,95	12,72	11,15	12,72	9,53	21,34
18:41:04	61,63	4,88	3,95	12,72	11,15	12,72	9,53	24,67
18:51:17	61,63	4,81	3,95	12,72	11,15	12,72	9,53	24,67
18:51:54	61,63	4,95	3,95	12,72	11,15	12,72	9,53	24,67
18:54:35	61,63	4,74	3,95	12,72	11,15	12,72	9,53	24,67
18:54:57	61,63	4,88	3,95	12,72	11,15	12,72	9,53	24,67

Annex 5. T4C1 Thruster Operation TM-data based on available TM-data receipt sessions (25/11/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:24:08	0,00	0,00	0,00	2,78	
17:24:18	0,00	0,00	0,00	2,78	
17:24:28	0,00	0,00	0,00	2,78	
17:24:38	0,00	0,00	0,00	2,78	
17:24:48	0,00	0,00	0,00	2,78	
17:24:58	0,00	0,00	0,00	2,78	
17:25:08	0,00	0,00	0,00	2,78	
17:25:18	0,00	0,00	0,00	2,78	
17:25:28	0,00	0,00	0,00	2,78	
17:25:38	0,00	0,00	0,00	2,78	
17:25:48	0,00	0,00	0,00	2,78	
17:25:59	0,00	0,00	0,00	2,78	
17:26:08	0,00	0,00	0,00	2,78	
17:26:18	0,00	0,00	0,00	2,78	
17:26:28	0,00	0,00	0,00	2,78	
17:26:38	0,00	0,00	0,00	2,78	
17:26:48	0,00	0,00	0,00	2,78	
17:26:58	0,00	0,00	0,00	2,78	
17:27:09	0,00	0,00	0,00	2,78	
17:27:18	11,80	0,00	326	2,78	
17:27:28	12,00	0,00	326	2,78	
17:27:38	12,10	0,00	324	2,78	
17:27:48	12,00	0,00	326	2,78	
17:27:58	12,00	0,00	326	2,78	
17:28:08	11,90	0,00	326	2,78	
17:28:18	12,20	0,00	326	2,78	
17:28:28	12,10	0,00	326	2,78	
17:28:38	12,00	0,00	326	2,78	
17:28:48	12,00	0,00	326	2,78	
17:28:58	12,00	0,00	326	2,78	
17:29:08	12,00	0,00	326	2,78	
17:29:18	12,00	0,00	326	2,78	
17:29:28	12,20	0,00	326	2,78	
17:29:38	12,20	0,00	326	2,78	
17:29:48	12,30	0,00	326	2,78	
17:29:58	0,00	4,40	310	2,78	
17:30:08	0,00	4,87	308	2,78	
17:30:38	0,00	4,31	310	2,72	
17:31:08	0,00	4,65	308	2,72	
17:31:38	0,00	4,65	318	2,66	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:32:08	0,00	4,65	308	2,63	
17:32:38	0,00	4,62	308	2,75	
17:33:08	0,00	4,74	308	2,81	
17:33:38	0,00	4,77	308	2,75	
17:34:08	0,00	4,74	308	2,72	
17:34:38	0,00	4,65	316	2,66	
17:35:08	0,00	4,65	312	2,63	
17:35:38	0,00	4,65	308	2,69	
17:36:08	0,00	4,65	310	2,84	
17:36:38	0,00	4,65	314	2,78	
17:37:08	0,00	4,74	308	2,72	
17:37:38	0,00	4,65	314	2,69	
17:38:08	0,00	4,65	314	2,63	
17:38:38	0,00	4,71	310	2,60	
17:39:08	0,00	4,65	310	2,84	
17:39:38	0,00	4,65	308	2,78	
17:40:08	0,00	4,74	310	2,72	
17:40:38	0,00	4,77	310	2,72	
17:41:08	0,00	4,65	310	2,69	
17:41:38	0,00	4,62	314	2,63	
17:42:08	0,00	4,65	310	2,75	
17:42:38	0,00	4,65	310	2,81	
17:43:08	0,00	4,62	310	2,75	
17:43:38	0,00	4,65	316	2,72	
17:44:08	0,00	4,77	308	2,69	
17:44:38	0,00	4,77	310	2,63	
17:45:08	0,00	4,65	310	2,84	
17:46:08	0,00	4,65	316	2,78	
17:46:38	0,00	4,65	316	2,72	
17:47:08	0,00	4,65	308	2,69	
17:47:38	0,00	4,62	318	2,66	
17:48:08	0,00	4,65	308	2,60	
17:48:38	0,00	4,77	310	2,84	
17:49:08	0,00	4,68	310	2,81	
17:49:38	0,00	4,74	308	2,75	
17:50:08	0,00	4,68	310	2,72	
17:50:38	0,00	4,62	314	2,66	
17:51:08	0,00	4,68	310	2,63	
17:51:38	0,00	4,65	310	2,75	
17:52:08	0,00	4,65	316	2,84	
17:52:38	0,00	4,68	310	2,72	
17:53:08	0,00	4,77	310	2,72	
17:53:38	0,00	4,68	308	2,66	
17:54:08	0,00	4,77	310	2,66	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:54:38	0,00	4,65	308	2,63	
17:55:08	0,00	4,68	308	2,84	
17:55:38	0,00	4,65	316	2,78	
17:56:08	0,00	4,62	310	2,75	
17:56:38	0,00	4,68	318	2,72	
17:57:08	0,00	4,65	310	2,66	
17:57:38	0,00	4,65	308	2,63	
17:58:08	0,00	4,74	310	2,81	
17:58:38	0,00	4,68	310	2,78	
17:59:08	0,00	4,65	308	2,78	
17:59:38	0,00	4,77	310	2,72	
18:00:08	0,00	4,77	310	2,69	
18:00:38	0,00	4,65	310	2,63	
18:01:08	0,00	4,65	308	2,72	
18:01:38	0,00	4,74	308	2,84	
18:02:08	0,00	4,65	308	2,75	
18:02:38	0,00	4,65	310	2,72	
18:03:38	0,00	4,65	314	2,66	
18:04:08	0,00	4,65	310	2,63	
18:04:38	0,00	4,65	308	2,84	
18:05:08	0,00	4,71	308	2,78	
18:05:38	0,00	4,77	310	2,75	
18:06:08	0,00	4,65	308	2,72	
18:06:38	0,00	4,68	308	2,69	
18:07:08	0,00	4,62	310	2,63	
18:07:38	0,00	4,77	310	2,81	
18:08:08	0,00	4,74	308	2,81	
18:08:38	0,00	4,87	310	2,75	
18:09:08	0,00	4,62	310	2,72	
18:09:38	0,00	4,74	310	2,66	
18:10:08	0,00	4,65	318	2,63	
18:10:38	0,00	4,74	310	2,66	
18:11:08	0,00	4,65	316	2,84	
18:11:38	0,00	4,65	318	2,78	
18:12:08	0,00	4,87	310	2,72	
18:12:38	0,00	4,65	308	2,69	
18:13:08	0,00	4,65	308	2,66	
18:13:38	0,00	4,77	308	2,60	
18:14:08	0,00	4,68	310	2,84	
18:14:38	0,00	4,65	308	2,81	
18:15:08	0,00	4,65	310	2,75	
18:15:38	0,00	4,65	308	2,72	
18:16:08	0,00	4,65	308	2,66	
18:16:38	0,00	4,65	308	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:17:08	0,00	4,77	310	2,75	
18:17:38	0,00	4,77	310	2,84	
18:18:08	0,00	4,65	308	2,75	
18:19:08	0,00	4,62	318	2,69	
18:19:38	0,00	4,65	318	2,66	
18:20:08	0,00	4,87	310	2,66	
18:20:38	0,00	4,77	308	2,84	
18:21:38	0,00	4,65	318	2,72	
18:22:08	0,00	4,74	308	2,72	
18:22:38	0,00	4,71	308	2,66	
18:23:08	0,00	4,65	308	2,63	
18:23:38	0,00	4,77	308	2,81	
18:24:08	0,00	4,68	310	2,81	
18:24:38	0,00	4,62	310	2,75	
18:25:08	0,00	4,65	308	2,72	
18:25:38	0,00	4,65	310	2,66	
18:26:08	0,00	4,65	308	2,63	
18:26:38	0,00	4,65	314	2,72	
18:27:08	0,00	4,74	308	2,84	
18:27:38	0,00	4,74	308	2,78	
18:28:08	0,00	4,62	310	2,72	
18:28:38	0,00	4,77	308	2,69	
18:29:08	0,00	4,65	308	2,63	
18:29:38	0,00	4,62	310	2,60	
18:30:08	0,00	4,65	308	2,84	
18:30:38	0,00	4,62	310	2,81	
18:31:08	0,00	4,68	310	2,75	
18:31:38	0,00	4,74	310	2,72	
18:32:08	0,00	4,77	310	2,66	
18:32:38	0,00	4,62	308	2,63	
18:33:08	0,00	4,68	308	2,75	
18:33:38	0,00	4,74	308	2,84	
18:34:08	0,00	4,74	308	2,75	
18:34:38	0,00	4,65	308	2,72	
18:35:08	0,00	4,62	308	2,66	
18:35:38	0,00	4,62	310	2,63	
18:36:08	0,00	4,65	318	2,66	
18:37:08	0,00	4,77	308	2,78	
18:37:38	0,00	4,71	308	2,75	
18:38:08	0,00	4,62	308	2,72	
18:38:38	0,00	4,77	310	2,66	
18:39:38	0,00	4,65	308	2,78	
18:40:08	0,00	0,00	0,00	2,84	
18:40:38	0,00	0,00	0,00	2,87	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:41:08	0,00	0,00	0,00	2,84	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)				Temperature (°C)			
17:11:04	61,63	5,03	4,02	12,20	11,68	13,77	12,15	18,68
17:32:42	61,63	4,67	4,02	12,20	11,68	13,77	12,15	18,68
17:54:11	61,63	5,03	4,02	12,20	11,68	13,77	12,15	18,68
17:54:59	61,63	4,67	4,02	12,20	11,68	13,77	12,15	18,68
18:03:52	61,63	5,03	4,02	12,20	11,68	13,77	12,15	18,68
18:19:31	61,63	5,03	4,02	12,20	11,68	13,77	12,15	22,00
18:29:51	61,63	4,81	4,02	12,20	11,68	13,77	12,15	22,00
18:30:32	61,63	4,95	4,02	12,20	11,68	13,77	12,15	22,00
18:33:10	61,63	4,74	4,02	12,20	11,68	13,77	12,15	22,00
18:33:16	61,63	4,67	4,02	12,20	11,68	13,77	12,15	22,00
18:33:27	61,63	4,88	4,02	12,20	11,68	13,77	12,15	22,00
18:36:20	61,63	4,74	4,02	12,20	11,68	13,77	12,15	22,00
18:36:41	61,63	4,88	4,02	12,20	11,68	13,77	12,15	22,00
18:37:56	61,63	4,67	4,02	12,20	11,68	13,77	9,53	22,00

Annex 6. RT4C1 Thruster Operation TM-data based on available TM-data receipt sessions (29/11/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
16:44:14	0,00	0,00	0,00	2,84	
16:44:24	0,00	0,00	0,00	2,84	
16:44:34	0,00	0,00	0,00	2,84	
16:44:44	0,00	0,00	0,00	2,84	
16:44:54	0,00	0,00	0,00	2,84	
16:45:04	0,00	0,00	0,00	2,84	
16:45:14	0,00	0,00	0,00	2,84	
16:45:24	0,00	0,00	0,00	2,84	
16:45:34	0,00	0,00	0,00	2,84	
16:45:44	0,00	0,00	0,00	2,84	
16:45:54	0,00	0,00	0,00	2,84	
16:46:04	0,00	0,00	0,00	2,84	
16:46:14	0,00	0,00	0,00	2,84	
16:46:24	0,00	0,00	0,00	2,84	
16:46:34	0,00	0,00	0,00	2,84	
16:46:44	0,00	0,00	0,00	2,84	
16:46:54	0,00	0,00	0,00	2,84	
16:47:04	0,00	0,00	0,00	2,84	
16:47:14	12,10	0,00	322	2,84	
16:47:24	12,00	0,00	324	2,84	
16:47:34	12,00	0,00	322	2,84	
16:47:44	12,00	0,00	320	2,84	
16:47:54	12,00	0,00	322	2,84	
16:48:05	11,90	0,00	322	2,84	
16:48:14	12,00	0,00	322	2,84	
16:48:24	12,00	0,00	322	2,84	
16:48:34	11,90	0,00	322	2,84	
16:48:44	12,30	0,00	320	2,84	
16:48:54	12,30	0,00	322	2,84	
16:49:04	12,10	0,00	322	2,84	
16:49:14	12,10	0,00	322	2,84	
16:49:24	12,10	0,00	322	2,84	
16:49:34	12,00	0,00	322	2,84	
16:49:44	12,00	0,00	322	2,84	
16:49:54	0,00	3,85	310	2,81	
16:50:04	0,00	4,59	312	2,78	
16:51:04	0,00	4,46	308	2,72	
16:51:34	0,00	4,65	308	2,69	
16:52:04	0,00	4,68	308	2,63	
16:52:34	0,00	4,65	308	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
16:53:04	0,00	4,65	308	2,84	
16:53:34	0,00	4,65	308	2,75	
16:54:04	0,00	4,65	310	2,72	
16:54:34	0,00	4,65	308	2,66	
16:55:04	0,00	4,62	308	2,63	
16:55:34	0,00	4,62	310	2,66	
16:56:04	0,00	4,62	308	2,84	
16:56:34	0,00	4,62	308	2,78	
16:57:04	0,00	4,65	308	2,72	
16:57:34	0,00	4,65	318	2,69	
16:58:04	0,00	4,65	308	2,63	
16:58:34	0,00	4,62	308	2,60	
16:59:04	0,00	4,62	308	2,84	
16:59:34	0,00	4,65	308	2,78	
17:00:04	0,00	4,65	308	2,75	
17:00:34	0,00	4,65	310	2,72	
17:01:04	0,00	4,74	310	2,69	
17:01:34	0,00	4,62	314	2,63	
17:02:04	0,00	4,68	305	2,75	
17:02:34	0,00	4,65	308	2,81	
17:03:04	0,00	4,62	308	2,72	
17:03:34	0,00	4,62	305	2,72	
17:04:04	0,00	4,65	308	2,69	
17:04:34	0,00	4,65	308	2,63	
17:05:04	0,00	4,65	305	2,69	
17:05:34	0,00	4,68	310	2,84	
17:06:34	0,00	4,65	308	2,72	
17:07:04	0,00	4,65	308	2,69	
17:07:34	0,00	4,68	308	2,66	
17:08:04	0,00	4,62	308	2,60	
17:09:04	0,00	4,74	310	2,78	
17:09:34	0,00	4,65	308	2,75	
17:10:04	0,00	4,62	310	2,72	
17:10:34	0,00	4,62	308	2,66	
17:11:04	0,00	4,62	310	2,63	
17:11:34	0,00	4,62	310	2,78	
17:12:04	0,00	4,65	310	2,81	
17:12:34	0,00	4,62	308	2,75	
17:13:04	0,00	4,65	318	2,72	
17:13:34	0,00	4,62	318	2,69	
17:14:04	0,00	4,65	308	2,63	
17:14:34	0,00	4,65	308	2,72	
17:15:04	0,00	4,65	318	2,84	
17:15:34	0,00	4,65	308	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:16:04	0,00	4,62	305	2,69	
17:16:34	0,00	4,65	308	2,69	
17:17:04	0,00	4,65	308	2,66	
17:17:34	0,00	4,62	310	2,63	
17:18:04	0,00	4,62	308	2,84	
17:18:34	0,00	4,65	308	2,78	
17:19:04	0,00	4,62	308	2,75	
17:19:34	0,00	4,65	316	2,72	
17:20:04	0,00	4,65	308	2,66	
17:20:34	0,00	4,62	310	2,63	
17:21:04	0,00	4,62	308	2,78	
17:21:34	0,00	4,62	308	2,81	
17:22:04	0,00	4,74	310	2,75	
17:22:34	0,00	4,65	308	2,72	
17:23:04	0,00	4,65	308	2,66	
17:23:34	0,00	4,68	308	2,63	
17:24:04	0,00	4,62	308	2,84	
17:25:04	0,00	4,65	308	2,75	
17:25:34	0,00	4,65	308	2,72	
17:26:04	0,00	4,65	308	2,66	
17:27:04	0,00	4,65	308	2,63	
17:27:34	0,00	4,65	308	2,84	
17:28:04	0,00	4,62	308	2,78	
17:28:34	0,00	4,65	316	2,72	
17:29:04	0,00	4,62	308	2,69	
17:29:34	0,00	4,65	308	2,69	
17:30:04	0,00	4,65	310	2,63	
17:30:34	0,00	4,62	305	2,78	
17:31:04	0,00	4,65	308	2,81	
17:31:34	0,00	4,65	318	2,72	
17:32:04	0,00	4,62	310	2,72	
17:32:34	0,00	4,65	308	2,66	
17:33:04	0,00	4,59	308	2,66	
17:33:34	0,00	4,65	308	2,72	
17:34:04	0,00	4,62	308	2,84	
17:34:34	0,00	4,65	318	2,78	
17:35:04	0,00	4,65	310	2,72	
17:35:34	0,00	4,62	310	2,66	
17:36:04	0,00	4,62	308	2,66	
17:36:34	0,00	4,59	305	2,60	
17:37:04	0,00	4,77	308	2,84	
17:37:34	0,00	4,62	308	2,78	
17:38:04	0,00	4,68	308	2,75	
17:38:34	0,00	4,62	310	2,72	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:39:04	0,00	4,65	308	2,66	
17:39:34	0,00	4,65	310	2,63	
17:40:04	0,00	4,62	305	2,75	
17:40:34	0,00	4,62	308	2,81	
17:41:04	0,00	4,77	308	2,75	
17:41:34	0,00	4,62	308	2,69	
17:42:34	0,00	4,65	310	2,63	
17:43:04	0,00	4,62	310	2,69	
17:43:34	0,00	4,77	308	2,84	
17:44:04	0,00	4,62	308	2,78	
17:45:04	0,00	4,62	308	2,69	
17:45:34	0,00	4,65	308	2,66	
17:46:04	0,00	4,62	308	2,60	
17:46:34	0,00	4,65	308	2,84	
17:47:04	0,00	4,65	308	2,78	
17:47:34	0,00	4,62	308	2,75	
17:48:04	0,00	4,62	308	2,72	
17:48:34	0,00	4,62	308	2,69	
17:49:04	0,00	4,65	308	2,63	
17:49:34	0,00	4,62	308	2,75	
17:50:04	0,00	4,62	308	2,81	
17:50:34	0,00	4,65	316	2,75	
17:51:04	0,00	4,68	308	2,72	
17:51:34	0,00	4,65	318	2,66	
17:52:04	0,00	4,62	308	2,63	
17:52:34	0,00	4,62	318	2,66	
17:53:04	0,00	4,62	310	2,84	
17:53:34	0,00	4,65	316	2,78	
17:54:04	0,00	4,59	308	2,72	
17:54:34	0,00	4,65	310	2,69	
17:55:04	0,00	4,62	308	2,66	
17:55:34	0,00	4,65	308	2,60	
17:56:04	0,00	4,62	308	2,84	
17:56:34	0,00	4,74	310	2,78	
17:57:04	0,00	4,62	308	2,75	
17:57:34	0,00	4,65	308	2,72	
17:58:04	0,00	4,65	308	2,66	
17:58:34	0,00	4,62	308	2,63	
17:59:04	0,00	4,59	318	2,75	
17:59:34	0,00	4,62	308	2,84	
18:00:34	0,00	4,65	308	2,72	
18:01:04	0,00	4,65	310	2,66	
18:01:34	0,00	4,65	308	2,66	
18:02:04	0,00	4,62	308	2,66	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:03:04	0,00	4,62	308	2,78	
18:03:34	0,00	4,65	310	2,75	
18:04:04	0,00	4,62	310	2,72	
18:04:34	0,00	4,62	308	2,66	
18:05:04	0,00	4,65	305	2,63	
18:05:34	0,00	4,77	308	2,81	
18:06:04	0,00	4,62	310	2,81	
18:06:34	0,00	4,62	308	2,75	
18:07:04	0,00	4,65	308	2,72	
18:07:34	0,00	4,62	308	2,69	
18:08:04	0,00	4,65	308	2,63	
18:08:34	0,00	4,65	308	2,72	
18:09:04	0,00	4,62	310	2,84	
18:09:34	0,00	4,74	310	2,75	
18:10:04	0,00	4,62	308	2,69	
18:10:34	0,00	4,62	308	2,66	
18:11:04	0,00	4,65	308	2,63	
18:11:34	0,00	4,65	308	2,63	
18:12:04	0,00	4,65	308	2,84	
18:12:34	0,00	4,62	308	2,78	
18:13:04	0,00	4,65	308	2,75	
18:13:34	0,00	4,62	310	2,72	
18:14:04	0,00	4,65	308	2,69	
18:14:34	0,00	4,65	310	2,63	
18:15:04	0,00	4,62	308	2,78	
18:16:04	0,00	4,62	308	2,75	
18:16:34	0,00	4,65	308	2,72	
18:17:04	0,00	4,62	308	2,69	
18:17:34	0,00	4,65	318	2,63	
18:18:34	0,00	4,62	310	2,84	
18:19:04	0,00	4,62	308	2,78	
18:19:34	0,00	4,65	318	2,75	
18:20:04	0,00	4,62	310	2,69	
18:21:04	0,00	4,62	308	2,60	
18:21:34	0,00	4,65	308	2,84	
18:22:04	0,00	4,65	318	2,78	
18:22:34	0,00	4,65	308	2,72	
18:23:04	0,00	4,65	310	2,69	
18:23:34	0,00	4,65	308	2,69	
18:24:04	0,00	4,62	310	2,63	
18:24:34	0,00	4,65	305	2,75	
18:25:04	0,00	4,65	318	2,84	
18:25:34	0,00	4,65	308	2,75	
18:26:04	0,00	4,68	308	2,72	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:26:34	0,00	4,65	308	2,66	
18:27:04	0,00	4,65	308	2,63	
18:27:34	0,00	4,65	308	2,69	
18:28:04	0,00	4,65	308	2,84	
18:28:34	0,00	4,65	308	2,78	
18:29:04	0,00	4,65	308	2,75	
18:29:34	0,00	4,65	308	2,72	
18:30:04	0,00	4,65	308	2,66	
18:30:34	0,00	4,65	305	2,60	
18:31:04	0,00	4,65	308	2,81	
18:31:34	0,00	4,62	308	2,81	
18:32:04	0,00	4,62	308	2,75	
18:32:34	0,00	4,65	308	2,72	
18:33:04	0,00	4,74	310	2,69	
18:34:04	0,00	4,62	308	2,72	
18:34:34	0,00	4,65	312	2,84	
18:35:04	0,00	4,65	308	2,75	
18:35:34	0,00	4,65	310	2,72	
18:36:34	0,00	4,65	308	2,63	
18:37:04	0,00	4,65	308	2,60	
18:37:34	0,00	4,65	308	2,84	
18:38:04	0,00	4,62	308	2,81	
18:39:04	0,00	4,62	310	2,72	
18:39:34	0,00	4,65	308	2,69	
18:40:04	0,00	4,65	305	2,63	
18:40:34	0,00	4,62	308	2,75	
18:41:04	0,00	4,65	308	2,81	
18:42:04	0,00	4,65	318	2,72	
18:42:34	0,00	4,65	308	2,66	
18:43:04	0,00	4,62	308	2,63	
18:43:34	0,00	4,74	310	2,69	
18:44:04	0,00	4,65	308	2,84	
18:44:34	0,00	4,65	308	2,78	
18:45:04	0,00	4,65	308	2,75	
18:45:34	0,00	4,65	308	2,69	
18:46:04	0,00	4,65	314	2,66	
18:46:34	0,00	4,62	305	2,63	
18:47:04	0,00	4,65	308	2,81	
18:47:34	0,00	4,65	310	2,81	
18:48:04	0,00	4,62	310	2,75	
18:48:34	0,00	4,68	308	2,72	
18:49:04	0,00	4,62	310	2,66	
18:49:34	0,00	4,65	314	2,63	
18:50:04	0,00	0,00	0,00	2,60	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)				Temperature (°C)			
16:41:04	62,95	4,88	4,02	13,77	11,68	14,29	12,67	19,34
17:35:31	62,95	4,88	4,02	13,77	11,68	14,29	12,67	22,67
17:57:33	62,95	4,88	4,02	13,77	11,68	14,29	10,05	22,67
18:13:54	62,95	4,88	4,02	13,77	11,68	14,29	10,05	24,67
18:38:45	62,95	4,88	4,02	11,15	11,68	14,29	10,05	24,67
18:40:25	62,95	4,81	4,02	11,15	11,68	14,29	10,05	24,67
18:41:04	62,95	4,95	4,02	11,15	11,68	14,29	10,05	24,67
18:43:46	62,95	4,74	4,02	11,15	11,68	14,29	10,05	24,67
18:44:04	62,95	4,88	4,02	11,15	11,68	14,29	10,05	24,67
18:46:20	62,95	4,88	4,02	11,15	11,68	14,29	10,05	26,00
18:46:59	62,95	4,67	4,02	11,15	11,68	14,29	10,05	24,67
18:47:25	62,95	4,88	4,02	11,15	11,68	14,29	10,05	24,67

Annex 7. RT1C1 Thruster Operation TM-data based on available TM-data receipt sessions (04/12/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:44:04	0,00	0,00	0,00	2,81	
18:44:14	0,00	0,00	0,00	2,81	
18:44:24	0,00	0,00	0,00	2,81	
18:44:34	0,00	0,00	0,00	2,81	
18:44:44	0,00	0,00	0,00	2,81	
18:44:54	0,00	0,00	0,00	2,81	
18:45:04	0,00	0,00	0,00	2,81	
18:45:14	0,00	0,00	0,00	2,81	
18:45:24	0,00	0,00	0,00	2,81	
18:45:34	0,00	0,00	0,00	2,81	
18:45:44	0,00	0,00	0,00	2,81	
18:45:54	0,00	0,00	0,00	2,81	
18:46:04	0,00	0,00	0,00	2,81	
18:46:14	0,00	0,00	0,00	2,81	
18:46:25	0,00	0,00	0,00	2,81	
18:46:34	0,00	0,00	0,00	2,81	
18:46:44	0,00	0,00	0,00	2,81	
18:46:54	0,00	0,00	0,00	2,81	
18:47:04	0,00	0,00	0,00	2,81	
18:47:14	12,00	0,00	322	2,81	
18:47:24	12,00	0,00	322	2,81	
18:47:34	12,00	0,00	322	2,81	
18:47:44	11,90	0,00	322	2,81	
18:47:54	12,00	0,00	322	2,81	
18:48:04	12,00	0,00	322	2,81	
18:48:14	12,00	0,00	320	2,81	
18:48:24	12,20	0,00	322	2,81	
18:48:34	12,10	0,00	324	2,81	
18:48:44	12,10	0,00	322	2,81	
18:48:55	12,00	0,00	322	2,81	
18:49:04	12,00	0,00	322	2,81	
18:49:14	11,90	0,00	322	2,81	
18:49:24	11,90	0,00	324	2,81	
18:49:34	12,00	0,00	322	2,81	
18:49:44	12,00	3,40	308	2,81	
18:49:54	0,00	4,37	308	2,78	
18:50:04	0,00	4,65	308	2,75	
18:50:34	0,00	4,62	310	2,72	
18:51:04	0,00	4,65	308	2,69	
18:52:04	0,00	4,59	310	2,81	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
18:52:34	0,00	4,62	308	2,75	
18:53:04	0,00	4,65	308	2,72	
18:53:34	0,00	4,62	308	2,69	
18:54:34	0,00	4,65	308	2,63	
18:55:04	0,00	4,65	308	2,81	
18:55:34	0,00	4,59	310	2,78	
18:56:04	0,00	4,62	305	2,72	
18:57:04	0,00	4,62	310	2,66	
18:57:34	0,00	4,62	308	2,63	
18:58:04	0,00	4,65	305	2,84	
18:58:34	0,00	4,62	308	2,81	
18:59:04	0,00	4,65	310	2,75	
18:59:34	0,00	4,65	308	2,72	
19:00:04	0,00	4,62	308	2,66	
19:00:34	0,00	4,77	308	2,63	
19:01:04	0,00	4,65	308	2,75	
19:01:34	0,00	4,74	308	2,84	
19:02:04	0,00	4,62	308	2,75	
19:02:34	0,00	4,62	310	2,72	
19:03:04	0,00	4,71	308	2,66	
19:03:34	0,00	4,62	308	2,63	
19:04:04	0,00	4,65	308	2,66	
19:04:34	0,00	4,62	308	2,84	
19:05:04	0,00	4,65	314	2,78	
19:05:34	0,00	4,65	316	2,72	
19:06:04	0,00	4,59	308	2,69	
19:06:34	0,00	4,62	308	2,66	
19:07:04	0,00	4,62	308	2,60	
19:07:34	0,00	4,62	308	2,84	
19:08:04	0,00	4,65	308	2,81	
19:08:34	0,00	4,62	310	2,75	
19:09:04	0,00	4,62	318	2,72	
19:10:04	0,00	4,65	308	2,63	
19:10:34	0,00	4,77	308	2,75	
19:11:04	0,00	4,65	316	2,81	
19:11:34	0,00	4,62	310	2,75	
19:12:34	0,00	4,65	308	2,69	
19:13:04	0,00	4,65	310	2,63	
19:13:34	0,00	4,62	308	2,66	
19:14:04	0,00	4,65	310	2,84	
19:15:04	0,00	4,62	308	2,72	
19:15:34	0,00	4,62	308	2,69	
19:16:04	0,00	4,65	308	2,66	
19:16:34	0,00	4,62	310	2,60	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:17:04	0,00	4,62	310	2,84	
19:17:34	0,00	4,68	308	2,78	
19:18:04	0,00	4,65	318	2,75	
19:18:34	0,00	4,65	308	2,69	
19:19:04	0,00	4,59	310	2,66	
19:19:34	0,00	4,59	308	2,63	
19:20:04	0,00	4,68	305	2,75	
19:20:34	0,00	4,62	308	2,81	
19:21:04	0,00	4,59	308	2,75	
19:21:34	0,00	4,62	308	2,69	
19:22:04	0,00	4,65	310	2,69	
19:22:34	0,00	4,65	308	2,63	
19:23:04	0,00	4,74	310	2,66	
19:23:34	0,00	4,65	308	2,84	
19:24:04	0,00	4,77	308	2,78	
19:24:34	0,00	4,62	308	2,72	
19:25:04	0,00	4,62	318	2,69	
19:25:34	0,00	4,62	308	2,63	
19:26:04	0,00	4,65	314	2,63	
19:26:34	0,00	4,62	308	2,81	
19:27:04	0,00	4,77	308	2,78	
19:28:04	0,00	4,65	308	2,72	
19:28:34	0,00	4,65	308	2,66	
19:29:04	0,00	4,77	308	2,63	
19:29:34	0,00	4,62	308	2,75	
19:30:04	0,00	4,62	308	2,75	
19:31:04	0,00	4,65	318	2,72	
19:31:34	0,00	4,77	308	2,66	
19:32:04	0,00	4,62	310	2,63	
19:33:04	0,00	4,65	314	2,84	
19:33:34	0,00	4,62	308	2,78	
19:34:04	0,00	4,62	310	2,75	
19:34:34	0,00	4,71	308	2,69	
19:35:04	0,00	4,74	308	2,66	
19:35:34	0,00	4,62	308	2,63	
19:36:04	0,00	4,71	308	2,84	
19:36:34	0,00	4,65	308	2,81	
19:37:04	0,00	4,59	318	2,75	
19:37:34	0,00	4,62	310	2,72	
19:38:04	0,00	4,74	310	2,66	
19:38:34	0,00	4,74	308	2,63	
19:39:04	0,00	4,62	310	2,75	
19:39:34	0,00	4,65	308	2,84	
19:40:04	0,00	4,65	316	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
19:40:34	0,00	4,65	308	2,72	
19:41:04	0,00	4,77	316	2,66	
19:41:34	0,00	4,65	318	2,66	
19:42:04	0,00	4,65	310	2,66	
19:42:34	0,00	4,65	310	2,84	
19:43:04	0,00	4,74	310	2,78	
19:43:34	0,00	4,71	310	2,72	
19:44:04	0,00	4,65	316	2,72	
19:44:34	0,00	4,59	308	2,66	
19:45:04	0,00	4,65	312	2,63	
19:46:04	0,00	4,65	308	2,81	
19:46:34	0,00	4,68	308	2,75	
19:47:04	0,00	4,68	308	2,72	
19:47:34	0,00	4,65	308	2,69	
19:48:34	0,00	4,65	310	2,72	
19:49:04	0,00	4,62	308	2,84	
19:49:34	0,00	4,62	308	2,75	
19:50:04	0,00	4,65	308	2,69	
19:51:04	0,00	4,65	308	2,66	
19:51:34	0,00	4,65	308	2,63	
19:52:04	0,00	4,62	308	2,84	
19:52:34	0,00	4,62	308	2,78	
19:53:04	0,00	4,65	318	2,72	
19:53:34	0,00	4,65	308	2,72	
19:54:04	0,00	4,62	308	2,66	
19:54:34	0,00	4,62	310	2,63	
19:55:04	0,00	4,59	308	2,78	
19:55:34	0,00	4,62	310	2,81	
19:56:04	0,00	4,68	310	2,75	
19:56:34	0,00	4,68	305	2,72	
19:57:04	0,00	4,59	310	2,69	
19:57:34	0,00	4,62	310	2,63	
19:58:04	0,00	4,62	308	2,72	
19:58:34	0,00	4,65	308	2,84	
19:59:04	0,00	4,65	318	2,78	
19:59:34	0,00	4,62	310	2,72	
20:00:04	0,00	4,62	308	2,69	
20:00:34	0,00	4,77	308	2,66	
20:01:04	0,00	4,62	308	2,60	
20:01:34	0,00	4,65	308	2,84	
20:02:04	0,00	4,68	310	2,78	
20:02:34	0,00	4,62	308	2,75	
20:03:04	0,00	4,65	308	2,72	
20:04:04	0,00	4,62	318	2,63	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
20:04:34	0,00	4,62	310	2,75	
20:05:04	0,00	4,62	308	2,81	
20:05:34	0,00	4,62	308	2,75	
20:06:34	0,00	4,68	308	2,66	
20:07:04	0,00	4,62	308	2,63	
20:07:34	0,00	4,62	308	2,66	
20:08:04	0,00	4,74	308	2,84	
20:09:04	0,00	4,65	316	2,72	
20:09:34	0,00	4,65	316	2,69	
20:10:04	0,00	4,62	308	2,63	
20:10:34	0,00	4,65	318	2,60	
20:11:04	0,00	4,62	308	2,84	
20:11:34	0,00	4,68	308	2,78	
20:12:04	0,00	4,62	318	2,75	
20:12:34	0,00	4,59	318	2,72	
20:13:04	0,00	4,65	308	2,66	
20:13:34	0,00	4,68	308	2,63	
20:14:04	0,00	4,62	305	2,75	
20:14:34	0,00	4,62	308	2,84	
20:15:04	0,00	0,00	0,00	2,78	
20:15:34	0,00	0,00	0,00	2,78	
20:16:04	0,00	0,00	0,00	2,78	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 1
Pressure (kgf/cm ²)				Temperature (°C)				
18:41:04	61,63	4,88	3,95	12,72	12,72	14,29	10,58	8,61
20:07:13	61,63	4,88	3,95	12,72	12,72	14,29	10,58	11,96
20:07:21	61,63	4,81	3,95	12,72	12,72	14,29	10,58	11,96
20:08:02	61,63	4,88	3,95	12,72	12,72	14,29	10,58	11,96
20:10:53	61,63	4,74	3,95	12,72	12,72	14,29	10,58	11,96
20:11:18	61,63	4,88	3,95	12,72	12,72	14,29	10,58	11,96
20:13:52	61,63	4,74	3,95	12,72	12,72	14,29	10,58	11,96
20:14:32	61,63	4,88	3,95	12,72	12,72	14,29	10,58	11,96

Annex 8. RT2C1 Thruster Operation TM-data based on available TM-data receipt sessions (05/12/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
05:54:04	0,00	0,00	0,00	2,78	
05:54:14	0,00	0,00	0,00	2,78	
05:54:24	0,00	0,00	0,00	2,78	
05:54:34	0,00	0,00	0,00	2,78	
05:54:44	0,00	0,00	0,00	2,78	
05:54:54	0,00	0,00	0,00	2,78	
05:55:04	0,00	0,00	0,00	2,78	
05:55:14	0,00	0,00	0,00	2,78	
05:55:24	0,00	0,00	0,00	2,78	
05:55:34	0,00	0,00	0,00	2,78	
05:55:44	0,00	0,00	0,00	2,78	
05:55:54	0,00	0,00	0,00	2,78	
05:56:04	0,00	0,00	0,00	2,78	
05:56:14	0,00	0,00	0,00	2,78	
05:56:24	0,00	0,00	0,00	2,78	
05:56:34	0,00	0,00	0,00	2,78	
05:56:44	0,00	0,00	0,00	2,78	
05:56:54	0,00	0,00	0,00	2,78	
05:57:04	0,00	0,00	0,00	2,78	
05:57:14	12,00	0,00	322	2,78	
05:57:24	12,00	0,00	322	2,78	
05:57:34	12,00	0,00	322	2,78	
05:57:44	11,90	0,00	322	2,78	
05:57:54	12,00	0,00	322	2,78	
05:58:04	12,00	0,00	322	2,78	
05:58:14	12,20	0,00	322	2,78	
05:58:24	12,10	0,00	322	2,78	
05:58:34	12,00	0,00	322	2,78	
05:58:44	12,00	0,00	322	2,78	
05:58:54	11,90	0,00	322	2,78	
05:59:04	11,90	0,00	322	2,78	
05:59:14	11,90	0,00	322	2,78	
05:59:24	12,00	0,00	322	2,78	
05:59:34	12,00	0,00	322	2,78	
05:59:44	12,10	0,00	322	2,78	
05:59:54	0,00	4,40	308	2,78	
06:00:04	0,00	4,65	308	2,78	
06:00:34	0,00	4,62	308	2,75	
06:01:04	0,00	4,65	310	2,72	
06:01:34	0,00	4,65	308	2,69	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
06:02:04	0,00	4,71	308	2,63	
06:03:04	0,00	4,68	308	2,84	
06:03:34	0,00	4,62	308	2,75	
06:04:04	0,00	4,65	308	2,72	
06:04:34	0,00	4,62	310	2,66	
06:05:04	0,00	4,62	308	2,66	
06:05:34	0,00	4,65	305	2,63	
06:06:04	0,00	4,62	308	2,84	
06:06:34	0,00	4,65	308	2,78	
06:07:04	0,00	4,65	305	2,72	
06:07:34	0,00	4,62	310	2,72	
06:08:04	0,00	4,65	305	2,66	
06:08:34	0,00	4,62	308	2,63	
06:09:04	0,00	4,62	305	2,78	
06:09:34	0,00	4,65	308	2,81	
06:10:04	0,00	4,62	308	2,75	
06:10:34	0,00	4,62	308	2,72	
06:11:04	0,00	4,65	308	2,66	
06:11:34	0,00	4,71	310	2,63	
06:12:04	0,00	4,59	308	2,66	
06:12:34	0,00	4,68	308	2,84	
06:13:04	0,00	4,65	314	2,78	
06:13:34	0,00	4,65	308	2,72	
06:14:04	0,00	4,65	308	2,69	
06:14:34	0,00	4,65	308	2,63	
06:15:04	0,00	4,65	310	2,63	
06:16:04	0,00	4,62	310	2,81	
06:16:34	0,00	4,65	314	2,75	
06:17:04	0,00	4,68	308	2,72	
06:17:34	0,00	4,68	305	2,69	
06:18:04	0,00	4,74	310	2,63	
06:18:34	0,00	4,65	308	2,72	
06:19:04	0,00	4,62	308	2,84	
06:19:34	0,00	4,65	308	2,75	
06:20:04	0,00	4,77	308	2,72	
06:21:04	0,00	4,65	308	2,66	
06:21:34	0,00	4,65	308	2,63	
06:22:04	0,00	4,65	310	2,84	
06:22:34	0,00	4,65	314	2,78	
06:23:04	0,00	4,65	310	2,75	
06:23:34	0,00	4,59	310	2,72	
06:24:04	0,00	4,74	310	2,66	
06:24:34	0,00	4,59	308	2,63	
06:25:04	0,00	4,62	305	2,78	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
06:25:34	0,00	4,65	308	2,81	
06:26:04	0,00	4,74	308	2,75	
06:26:34	0,00	4,65	308	2,72	
06:27:04	0,00	4,71	308	2,66	
06:27:34	0,00	4,68	308	2,63	
06:28:04	0,00	4,71	308	2,66	
06:28:34	0,00	4,62	308	2,84	
06:29:04	0,00	4,62	310	2,78	
06:29:34	0,00	4,62	310	2,75	
06:30:04	0,00	4,62	310	2,72	
06:30:34	0,00	4,62	310	2,66	
06:31:04	0,00	4,71	308	2,63	
06:31:34	0,00	4,77	308	2,81	
06:32:04	0,00	4,62	310	2,81	
06:32:34	0,00	4,65	310	2,75	
06:33:04	0,00	4,62	308	2,72	
06:33:34	0,00	4,59	310	2,66	
06:34:04	0,00	4,77	308	2,63	
06:34:34	0,00	4,71	308	2,66	
06:35:04	0,00	4,68	308	2,84	
06:35:34	0,00	4,62	305	2,78	
06:36:04	0,00	4,65	308	2,72	
06:36:34	0,00	4,62	310	2,69	
06:37:04	0,00	4,77	308	2,66	
06:37:34	0,00	4,62	310	2,63	
06:38:04	0,00	4,65	308	2,84	
06:39:04	0,00	4,68	308	2,75	
06:39:34	0,00	4,65	310	2,72	
06:40:04	0,00	4,59	314	2,69	
06:40:34	0,00	4,65	310	2,63	
06:41:04	0,00	4,65	305	2,72	
06:41:34	0,00	4,65	308	2,84	
06:42:04	0,00	4,62	308	2,75	
06:42:34	0,00	4,62	308	2,72	
06:43:04	0,00	4,71	308	2,69	
06:43:34	0,00	4,62	310	2,66	
06:44:04	0,00	4,65	305	2,63	
06:44:34	0,00	4,62	310	2,84	
06:45:04	0,00	4,65	308	2,78	
06:45:34	0,00	4,59	308	2,75	
06:46:04	0,00	4,68	305	2,72	
06:46:34	0,00	4,62	303	2,66	
06:47:04	0,00	4,65	308	2,63	
06:47:34	0,00	4,65	305	2,75	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
06:48:04	0,00	4,65	316	2,84	
06:48:34	0,00	4,62	308	2,75	
06:49:04	0,00	4,62	308	2,72	
06:49:34	0,00	4,65	308	2,66	
06:50:04	0,00	4,62	310	2,66	
06:50:34	0,00	4,62	305	2,63	
06:51:04	0,00	4,62	308	2,84	
06:51:34	0,00	4,62	314	2,78	
06:52:04	0,00	4,77	308	2,75	
06:52:34	0,00	4,62	305	2,72	
06:53:04	0,00	4,68	308	2,66	
06:53:34	0,00	4,62	308	2,63	
06:54:04	0,00	4,65	308	2,78	
06:54:34	0,00	4,65	308	2,81	
06:55:04	0,00	4,65	308	2,75	
06:55:34	0,00	4,62	308	2,72	
06:56:04	0,00	4,74	310	2,66	
06:57:04	0,00	4,68	308	2,69	
06:57:34	0,00	4,62	314	2,84	
06:58:04	0,00	4,65	314	2,75	
06:58:34	0,00	4,59	308	2,75	
06:59:04	0,00	4,65	305	2,72	
06:59:34	0,00	4,62	305	2,66	
07:00:04	0,00	4,68	308	2,63	
07:00:34	0,00	4,65	308	2,81	
07:01:04	0,00	4,62	308	2,81	
07:01:34	0,00	4,59	310	2,75	
07:02:04	0,00	4,62	308	2,69	
07:02:34	0,00	4,59	310	2,69	
07:03:04	0,00	4,65	308	2,63	
07:03:34	0,00	4,68	305	2,69	
07:04:04	0,00	4,62	310	2,81	
07:04:34	0,00	4,65	308	2,78	
07:05:04	0,00	4,65	308	2,72	
07:05:34	0,00	4,71	308	2,69	
07:06:04	0,00	4,62	308	2,66	
07:06:34	0,00	4,62	308	2,63	
07:07:04	0,00	4,62	305	2,84	
07:07:34	0,00	4,62	308	2,81	
07:08:04	0,00	4,62	310	2,75	
07:09:04	0,00	4,68	308	2,69	
07:09:34	0,00	4,65	314	2,63	
07:10:04	0,00	4,65	314	2,72	
07:10:34	0,00	4,65	314	2,84	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
07:11:04	0,00	4,62	308	2,78	
07:11:34	0,00	4,62	308	2,72	
07:12:04	0,00	4,77	308	2,69	
07:12:34	0,00	4,65	316	2,66	
07:13:04	0,00	4,65	308	2,60	
07:13:34	0,00	4,62	310	2,84	
07:14:04	0,00	4,65	308	2,81	
07:15:04	0,00	4,65	314	2,72	
07:15:34	0,00	4,65	308	2,66	
07:16:04	0,00	4,65	316	2,63	
07:16:34	0,00	4,62	305	2,72	
07:17:04	0,00	4,62	308	2,84	
07:17:34	0,00	4,68	308	2,75	
07:18:04	0,00	4,65	308	2,72	
07:18:34	0,00	4,62	310	2,69	
07:19:04	0,00	4,71	308	2,63	
07:19:34	0,00	4,65	318	2,63	
07:20:04	0,00	4,65	308	2,84	
07:20:34	0,00	4,62	308	2,78	
07:21:04	0,00	4,65	308	2,75	
07:21:34	0,00	4,65	308	2,72	
07:22:04	0,00	4,65	314	2,66	
07:22:34	0,00	4,65	308	2,63	
07:23:04	0,00	4,65	318	2,75	
07:23:34	0,00	4,62	318	2,84	
07:24:04	0,00	4,62	308	2,75	
07:24:34	0,00	4,65	308	2,72	
07:25:04	0,00	4,68	308	2,69	
07:25:34	0,00	4,62	308	2,63	
07:26:04	0,00	4,65	308	2,63	
07:26:34	0,00	4,71	308	2,84	
07:27:04	0,00	4,77	308	2,78	
07:27:34	0,00	4,62	308	2,75	
07:28:04	0,00	4,62	308	2,72	
07:28:34	0,00	4,74	310	2,66	
07:29:04	0,00	4,62	305	2,63	
07:29:34	0,00	4,65	318	2,75	
07:30:04	0,00	0,00	0,00	2,84	
07:30:34	0,00	0,00	0,00	2,84	
07:35:04	0,00	0,00	0,00	2,84	
07:35:34	0,00	0,00	0,00	2,84	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 2
	Pressure (kgf/cm ²)			Temperature (°C)				
05:51:04	61,63	4,88	3,95	10,10	13,25	13,25	7,43	8,61
07:05:37	61,63	4,88	3,95	10,10	13,25	13,25	7,43	11,96
07:23:49	61,63	4,88	3,95	10,10	13,25	13,25	10,05	11,96
07:26:15	61,63	4,74	3,95	10,10	13,25	13,25	10,05	11,96
07:26:42	61,63	4,88	3,95	10,10	13,25	13,25	10,05	11,96
07:29:38	61,63	4,67	3,95	10,10	13,25	13,25	10,05	11,96

Annex 9. RT4C1 Thruster Operation TM-data based on available TM-data receipt sessions (21/12/00)

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
15:17:25	0,00	0,00	0,00	2,78	
15:17:35	0,00	0,00	0,00	2,78	
15:17:45	0,00	0,00	0,00	2,78	
15:17:55	0,00	0,00	0,00	2,78	
15:18:05	0,00	0,00	0,00	2,78	
15:18:15	0,00	0,00	0,00	2,78	
15:18:25	0,00	0,00	0,00	2,78	
15:18:35	0,00	0,00	0,00	2,78	
15:18:45	0,00	0,00	0,00	2,78	
15:18:55	0,00	0,00	0,00	2,78	
15:19:05	0,00	0,00	0,00	2,78	
15:19:15	0,00	0,00	0,00	2,78	
15:19:25	0,00	0,00	330	2,78	
15:19:35	12,00	0,00	322	2,78	
15:19:45	11,90	0,00	322	2,78	
15:19:55	12,00	0,00	322	2,78	
15:20:06	12,00	0,00	322	2,78	
15:20:15	12,00	0,00	322	2,78	
15:20:25	11,90	0,00	322	2,78	
15:20:35	12,00	0,00	322	2,78	
15:20:45	12,00	0,00	324	2,78	
15:20:55	11,90	0,00	322	2,78	
15:21:05	12,30	0,00	322	2,78	
15:21:15	12,30	0,00	322	2,78	
15:21:25	12,20	0,00	322	2,78	
15:21:35	12,10	0,00	322	2,78	
15:21:45	12,00	0,00	322	2,78	
15:21:55	12,00	0,00	322	2,78	
15:22:05	0,00	3,43	310	2,78	
15:22:15	0,00	3,92	308	2,78	
15:22:25	0,00	4,68	308	2,78	
15:22:55	0,00	4,65	310	2,75	
15:23:25	0,00	4,65	310	2,72	
15:23:55	0,00	4,77	308	2,66	
15:24:25	0,00	4,22	314	2,63	
15:24:55	0,00	4,65	308	2,69	
15:25:25	0,00	4,65	308	2,84	
15:25:55	0,00	4,65	316	2,78	
15:26:25	0,00	4,65	308	2,69	
15:26:55	0,00	4,65	308	2,69	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
15:27:25	0,00	4,65	316	2,63	
15:27:55	0,00	4,62	305	2,63	
15:28:25	0,00	4,62	308	2,84	
15:28:55	0,00	4,65	310	2,78	
15:29:25	0,00	4,62	308	2,75	
15:29:55	0,00	4,77	308	2,72	
15:30:55	0,00	4,65	308	2,63	
15:31:25	0,00	4,65	305	2,78	
15:31:55	0,00	4,68	308	2,81	
15:32:25	0,00	4,62	314	2,75	
15:33:25	0,00	4,65	308	2,66	
15:33:55	0,00	4,65	308	2,63	
15:34:25	0,00	4,77	308	2,72	
15:34:55	0,00	4,62	308	2,84	
15:35:25	0,00	4,65	308	2,75	
15:35:55	0,00	4,65	308	2,72	
15:36:25	0,00	4,62	316	2,69	
15:36:55	0,00	4,77	308	2,66	
15:37:25	0,00	4,71	308	2,63	
15:37:55	0,00	4,65	308	2,84	
15:38:25	0,00	4,65	308	2,78	
15:38:55	0,00	4,71	310	2,72	
15:39:25	0,00	4,62	308	2,69	
15:39:55	0,00	4,62	308	2,63	
15:40:25	0,00	4,77	308	2,60	
15:40:55	0,00	4,62	310	2,84	
15:41:25	0,00	4,65	308	2,78	
15:41:55	0,00	4,65	308	2,75	
15:42:25	0,00	4,77	308	2,69	
15:42:55	0,00	4,65	308	2,69	
15:43:25	0,00	4,77	308	2,63	
15:43:55	0,00	4,65	314	2,75	
15:44:25	0,00	4,65	308	2,84	
15:44:55	0,00	4,77	308	2,75	
15:45:25	0,00	4,74	310	2,72	
15:45:55	0,00	4,62	310	2,66	
15:46:25	0,00	4,74	310	2,63	
15:46:55	0,00	4,65	305	2,72	
15:47:25	0,00	4,77	310	2,84	
15:47:55	0,00	4,65	308	2,78	
15:48:55	0,00	4,62	308	2,69	
15:49:25	0,00	4,65	305	2,63	
15:49:55	0,00	4,62	308	2,63	
15:50:25	0,00	4,62	308	2,84	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
15:51:25	0,00	4,65	310	2,72	
15:51:55	0,00	4,62	308	2,72	
15:52:25	0,00	4,62	308	2,66	
15:52:55	0,00	4,62	314	2,63	
15:53:25	0,00	4,65	308	2,78	
15:53:55	0,00	4,62	308	2,81	
15:54:25	0,00	4,77	308	2,75	
15:54:55	0,00	4,68	308	2,72	
15:55:25	0,00	4,77	308	2,66	
15:55:55	0,00	4,77	308	2,63	
15:56:25	0,00	4,62	310	2,72	
15:56:55	0,00	4,71	308	2,84	
15:57:25	0,00	4,59	308	2,75	
15:57:55	0,00	4,71	310	2,72	
15:58:25	0,00	4,62	310	2,66	
15:58:55	0,00	4,62	310	2,63	
15:59:25	0,00	4,65	310	2,66	
15:59:55	0,00	4,65	308	2,84	
16:00:25	0,00	4,65	308	2,78	
16:00:55	0,00	4,65	308	2,75	
16:01:25	0,00	4,71	310	2,72	
16:01:55	0,00	4,62	308	2,66	
16:02:25	0,00	4,71	308	2,63	
16:02:55	0,00	4,65	314	2,84	
16:03:25	0,00	4,65	310	2,81	
16:03:55	0,00	4,65	308	2,75	
16:04:25	0,00	4,65	308	2,72	
16:04:55	0,00	4,62	308	2,66	
16:05:25	0,00	4,62	310	2,63	
16:05:55	0,00	4,62	318	2,75	
16:06:55	0,00	4,59	310	2,75	
16:07:25	0,00	4,62	312	2,72	
16:07:55	0,00	4,77	308	2,69	
16:08:25	0,00	4,65	308	2,66	
16:09:25	0,00	4,65	308	2,84	
16:09:55	0,00	4,68	308	2,78	
16:10:25	0,00	4,62	314	2,72	
16:10:55	0,00	4,68	308	2,69	
16:11:25	0,00	4,65	308	2,63	
16:11:55	0,00	4,65	308	2,63	
16:12:25	0,00	4,62	308	2,84	
16:12:55	0,00	4,59	312	2,78	
16:13:25	0,00	4,65	308	2,75	
16:13:55	0,00	4,65	310	2,72	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
16:14:25	0,00	4,65	308	2,66	
16:14:55	0,00	4,62	308	2,60	
16:15:25	0,00	4,62	318	2,75	
16:15:55	0,00	4,65	316	2,81	
16:16:25	0,00	4,68	308	2,75	
16:16:55	0,00	4,65	318	2,72	
16:17:25	0,00	4,71	310	2,66	
16:17:55	0,00	4,71	310	2,63	
16:18:25	0,00	4,62	308	2,69	
16:18:55	0,00	4,62	310	2,84	
16:19:25	0,00	4,65	308	2,78	
16:19:55	0,00	4,65	308	2,72	
16:20:25	0,00	4,65	316	2,69	
16:20:55	0,00	4,65	308	2,66	
16:21:25	0,00	4,68	308	2,63	
16:21:55	0,00	4,62	310	2,84	
16:22:25	0,00	4,71	310	2,78	
16:22:55	0,00	4,62	310	2,75	
16:23:25	0,00	4,65	308	2,72	
16:23:55	0,00	4,62	310	2,69	
16:24:55	0,00	4,65	308	2,75	
16:25:25	0,00	4,71	305	2,81	
16:25:55	0,00	4,62	305	2,75	
16:26:25	0,00	4,65	316	2,72	
16:27:25	0,00	4,62	308	2,63	
16:27:55	0,00	4,65	308	2,69	
16:28:25	0,00	4,62	310	2,84	
16:28:55	0,00	4,62	308	2,78	
16:29:25	0,00	4,65	308	2,75	
16:29:55	0,00	4,62	310	2,72	
16:30:25	0,00	4,62	308	2,69	
16:30:55	0,00	4,65	308	2,63	
16:31:25	0,00	4,62	308	2,72	
16:31:55	0,00	4,65	308	2,84	
16:32:25	0,00	4,65	316	2,78	
16:32:55	0,00	4,77	308	2,72	
16:33:25	0,00	4,62	308	2,69	
16:33:55	0,00	4,65	308	2,63	
16:34:25	0,00	4,65	308	2,63	
16:34:55	0,00	4,65	308	2,84	
16:35:25	0,00	4,62	310	2,78	
16:35:55	0,00	4,62	308	2,75	
16:36:25	0,00	4,62	310	2,72	
16:36:55	0,00	4,65	308	2,66	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
16:37:25	0,00	4,65	308	2,63	
16:37:55	0,00	4,62	310	2,75	
16:38:25	0,00	4,62	308	2,81	
16:38:55	0,00	4,62	308	2,75	
16:39:25	0,00	4,62	308	2,69	
16:39:55	0,00	4,62	308	2,66	
16:40:25	0,00	4,62	310	2,63	
16:40:55	0,00	4,59	310	2,72	
16:41:25	0,00	4,62	308	2,84	
16:41:55	0,00	4,74	310	2,78	
16:42:25	0,00	4,62	308	2,69	
16:43:25	0,00	4,65	308	2,66	
16:43:55	0,00	4,65	308	2,63	
16:44:25	0,00	4,62	310	2,84	
16:45:25	0,00	4,62	308	2,72	
16:45:55	0,00	4,65	308	2,72	
16:46:25	0,00	4,62	308	2,66	
16:46:55	0,00	4,62	310	2,63	
16:47:25	0,00	4,65	305	2,81	
16:47:55	0,00	4,62	308	2,81	
16:48:25	0,00	4,65	308	2,75	
16:48:55	0,00	4,59	308	2,72	
16:49:25	0,00	4,65	314	2,66	
16:49:55	0,00	4,65	308	2,63	
16:50:25	0,00	4,62	305	2,72	
16:50:55	0,00	4,62	308	2,84	
16:51:25	0,00	4,62	310	2,75	
16:51:55	0,00	4,65	312	2,72	
16:52:25	0,00	4,62	305	2,69	
16:52:55	0,00	4,62	305	2,63	
16:53:25	0,00	4,65	305	2,63	
16:53:55	0,00	4,62	308	2,84	
16:54:25	0,00	4,62	308	2,78	
16:54:55	0,00	4,65	310	2,72	
16:55:25	0,00	4,62	314	2,72	
16:55:55	0,00	4,65	318	2,66	
16:56:25	0,00	4,62	308	2,63	
16:56:55	0,00	4,65	312	2,78	
16:57:25	0,00	4,74	310	2,81	
16:57:55	0,00	4,65	318	2,75	
16:58:25	0,00	4,65	308	2,72	
16:58:55	0,00	4,68	308	2,66	
16:59:25	0,00	4,59	310	2,63	
16:59:55	0,00	4,65	308	2,72	

Time, hh:mm:ss	Cathode Current, A	Anode Current, A	Anode Voltage, V	Xe Feed Unit Output, (kgf/sm ²)	Comments
17:00:55	0,00	4,65	310	2,78	
17:01:25	0,00	4,65	308	2,72	
17:01:55	0,00	4,62	308	2,69	
17:02:25	0,00	4,62	310	2,66	
17:03:25	0,00	4,62	308	2,84	
17:03:55	0,00	4,65	308	2,78	
17:04:25	0,00	4,65	308	2,72	
17:04:55	0,00	4,62	305	2,72	
17:05:25	0,00	4,62	305	2,66	
17:05:55	0,00	4,77	312	2,63	
17:06:25	0,00	4,74	310	2,78	
17:06:55	0,00	4,62	308	2,81	
17:07:25	0,00	4,62	308	2,78	
17:07:55	0,00	4,62	310	2,72	
17:08:25	0,00	4,65	308	2,66	
17:08:55	0,00	4,62	310	2,63	
17:09:25	0,00	4,59	308	2,72	
17:09:55	0,00	4,65	308	2,84	
17:10:25	0,00	4,71	310	2,78	
17:10:55	0,00	4,62	308	2,72	
17:11:25	0,00	4,71	310	2,69	
17:11:55	0,00	4,65	314	2,63	
17:12:25	0,00	4,65	310	2,63	
17:12:55	0,00	4,65	308	2,84	
17:13:25	0,00	4,74	310	2,78	
17:13:55	0,00	4,62	318	2,75	
17:14:25	0,00	4,65	308	2,72	
17:14:55	0,00	4,62	310	2,66	
17:15:25	0,00	4,62	308	2,75	
17:15:55	0,00	4,65	308	2,78	
17:16:25	0,00	4,65	308	2,72	
17:16:55	0,00	4,65	308	2,72	
17:17:25	0,00	4,62	308	2,66	
17:17:55	0,00	4,62	308	2,63	
17:18:55	0,00	4,62	308	2,81	
17:19:25	0,00	4,65	316	2,75	
17:19:55	0,00	4,65	308	2,72	
17:20:25	0,00	4,59	310	2,69	
17:21:25	0,00	4,68	310	2,72	
17:21:55	0,00	4,62	308	2,84	
17:22:25	0,00	0,00	0,00	2,81	
17:22:55	0,00	0,00	0,00	2,81	
17:26:55	0,00	0,00	0,00	2,81	

Time hh:mm:ss	Xe Feed Unit Input	Primary Xe Feed Branch	Redundant Xe Feed Branch	Xe Storage Unit 1	Xe Storage Unit 2	Xe Storage Unit 3	Xe Feed Unit	Thruster Unit 4
	Pressure (kgf/cm ²)				Temperature (°C)			
14:58:04	61,63	4,88	4,02	13,77	12,20	15,34	15,29	20,67
16:15:12	61,63	4,88	4,02	13,77	12,20	15,34	15,29	24,00
16:32:16	61,63	4,88	4,02	13,77	12,20	15,34	12,67	24,00
17:02:44	61,63	4,88	4,02	13,77	12,20	15,34	12,67	27,33
17:15:21	61,63	4,81	4,02	13,77	12,20	15,34	12,67	27,33
17:18:37	61,63	4,88	4,02	13,77	12,20	15,34	12,67	27,33
17:21:15	61,63	4,81	4,02	13,77	12,20	15,34	12,67	27,33

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13. ABSTRACT (Maximum 200 words) This 12-part report documents the data obtained from various sensor measurements taken aboard the Russian Express-A2 and Express-A3 spacecraft in Geosynchronous Earth Orbit (GEO). These GEO communications satellites, which were designed and built by NPO Prikladnoy Mekhaniki (NPO PM) of Zheleznogorsk, Russia, utilize Hall thruster propulsion systems for north-south and east-west stationkeeping and as of June 2002, were still operating at 80° E. and 11° W., respectively. Express-A2 was launched on March 12, 2000, while Express-A3 was launched on June 24, 2000. The diagnostic equipment from which these data were taken includes electric field strength sensors, ion current and energy sensors, and pressure sensors. The diagnostics and the Hall thruster propulsion systems are described in detail along with lists of tabular data from those diagnostics and propulsion system and other satellite systems. Space Power, Inc., now part of Pratt & Whitney's Chemical Systems Division, under contract NAS3-99151 to the NASA Glenn Research Center, obtained these data over several periods from March 12, 2000, through September 30, 2001. Each of the 12 individual reports describe, in detail, the propulsion systems as well as the diagnostic sensors utilized. Finally, parts 11 and 12 include the requirements to which NPO PM prepared and delivered these data.			
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